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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 21
NOVEMBER 1, 1974

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W74-10901 -- W74-11450

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 7, NUMBER 21
NOVEMBER 1, 1974

W74-10901 -- W74-11450

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
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06 WATER RESOURCES PLANNING
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07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

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ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

AN EMPIRICAL INTERMOLECULAR POTENTIAL ENERGY FUNCTION FOR WATER,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W74-11106

2. WATER CYCLE

2A. General

THE DETERMINATION OF ZONES OF INTENSE CONTRIBUTION TO STREAM FLOW AS RELATED TO THE CONCEPT OF PARTIAL AREA CONTRIBUTIONS,
Maryland Univ., College Park. Dept. of Civil Engineering.
V. C. Bissell, and R. M. Ragan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 623, $5.50 in paper copy, $2.25 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No 21 (1974). 188 p, 46 fig, 35 tab, 16 ref, 5 append. OWRR B-005-MD(1). 14-01-0001-1909.

Descriptors: *Storm runoff, *Distribution patterns, Areal, Forest watersheds, New England, Rainfall intensity, *Precipitation intensity, *Rainfall disposition, *Channel flow, Surface runoff, *Rainfall-runoff relationships.

An extensive field investigation was conducted at the University of Vermont in summer of 1966 to examine the physical processes contributing to areal and temporal distribution patterns of storm runoff from forested New England watersheds. The present study was directed at an extension of the limited conclusions of the earlier investigators by consolidation of several phases of independently collected data. The relative importance of such factors as precipitation intensity, duration, and volume in producing stormflow from isolated subareas was inspected. The source-wise distribution of laterial inflows to a selected stream channel reach was also monitored. Relative runoff contributions were evaluated during both storm and non-storm periods. The percent of rainfall returned to the channel as stormflow was found to be an order of magnitude greater from particular low-lying wet areas than from the entire area draining into the channel reach. It was found that these wet areas contributed a greater percentage of the lateral inflow to the reach during non-storm periods than during storm periods. The percent of rainfall returned as stormflow from the selected subareas during a storm showed a moderate dependence upon rainfall volume, while displaying little dependence upon storm intensity. The existence of active source areas for storm runoff was shown by the fact that over one-half the lateral inflow to the channel reach was contributed by subareas making up only 4.3% of the total area draining into the reach.
W74-10904

A FINITE ELEMENT APPROACH TO WATERSHED RUNOFF,
University Coll. of Swansea (Wales). Dept. of Civil Engineering.
C. Taylor, G. Al-Mashidani, and J. M. Davis.
Journal of Hydrology, Vol 21, No 3, p 231-246, 1974.

Descriptors: Model studies, *Simulation analysis, *Mathematical models, *Watershed management, *Runoff, *Algorithms, *Finite element analysis.

Watershed direct runoff problems are analyzed by a numerical finite element-based implicit recurrence relationship. The algorithm is shown in a two-dimensional form for the full momentum and continuity equations. It is presented unidimensionally for the kinematic wave theory. Because the whole domain is represented and solved as a single set of matrix equations, the advent of shocks for domains where appreciable changes in slope and/or resistance to flow occur is immediately recognizable. (Murphy-FIRL)
W74-10937

PIERRE PERRAULT: THE MAN AND HIS CONTRIBUTION TO MODERN HYDROLOGY,
Geological Survey, Raleigh, N.C.
R. L. Nace.
Water Resources Bulletin, Vol 10, No 4, p 633-647, August 1974. 16 ref.

Descriptors: *Hydrology, *History, *Hydrogeology, *Springs, Hydrologic cycle, Groundwater movement.

Pierre Perrault (1611-1680), was an amateur scientist and early hydrologist, a member of a bourgeois provincial family whose roots were in the Touraine region of France. One of six brothers, all characterized by brilliance and diversity, he was educated as a lawyer but turned to finance and rose to a high position under King Louis XIV. Owing to political naivete and financial imprudence, he fell into disgrace and went bankrupt. As an amateur scientist he wrote a book on the origin of springs. This book broke almost wholly with the traditional authoritarianism of 2,000 years' standing, and set hydrology on the modern path of observation and direct experiment. He developed the concept of the hydrological cycle, correctly accounting for the disposition of rainfall by evaporation, transpiration, groundwater recharge and runoff. Some of his ideas about specific processes were erroneous, but where he was wrong his errors were logically based. Much of his contribution to the foundation of scientific hydrology has been overlooked or distorted by historians and hydrologists. (Knapp-USGS)
W74-11206

USERS GUIDE FOR A U.S. GEOLOGICAL SURVEY RAINFALL-RUNOFF MODEL,
Geological Survey, Reston, Va.
C. W. Boning.
Open-file report 74-33, May 1974. 232 p, 2 fig, 2 tab, 2 ref.

Descriptors: *Mathematical models, *Computer programs, *Rainfall-runoff relationships, Streamflow forecasting, Runoff forecasting, Routing, Infiltration, Soil moisture, Synthetic hydrology, Simulation analysis.

The U.S. Geological Survey developed a rainfall-runoff model to synthesize flood discharges for small drainage areas. This report provides guidelines for the assembly, storage, and retrieval of data needed to use the model, and also provides descriptions and documentations of computer programs for model calibration and flood record synthesis. The model employs digital computer solutions of mathematical relations to approximate the hydrologic processes of infiltration, soil moisutre storage, and surface runoff routing. Constants and limits in the mathematical relations are determined automatically by an internal optimization procedure to calibrate the model to a specific drainage site. Recent modifications include the optimization of parameters in the surface runoff routing computations, and provisions for synthesizing flood runoff from small urban watersheds. (Knapp-USGS)
W74-11234

2B. Precipitation

THE DETERMINATION OF ZONES OF INTENSE CONTRIBUTION TO STREAM FLOW AS RELATED TO THE CONCEPT OF PARTIAL AREA CONTRIBUTIONS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10904

A SCHEME FOR ASSESSING THE RELIABILITY OF INTERPOLATED RAINFALL ESTIMATES,
Birmingham Univ. (England). Dept. of Civil Engineering.
P. S. Kelway.
Journal of Hydrology, Vol 21, No 3, p 247-267, 1974. 5 fig, 9 tab, 8 ref.

Descriptors: Model studies, *Computer models, *Stimulation analysis, *Rainfall, Hydrologic cycle, Rain gages, Distribution patterns, *Forecasting, *Estimating, *Reliability.

Quantification of the significance of variables controlling the reliability of interpolated estimates of rainfall is attempted. Alternative ways of expressing the gauge network and rainfall distribution patterns in a form that may be used in estimating equations for assessing error in interpolated values are examined. A scheme is devised for obtaining equations analytically for any interpolation method used to derive information; the results of a study relevant to a specific analysis technique are shown. The purpose of the scheme is to enable confidence limits to be placed on interpolated output during computer processing of rainfall data. Comparisons may then be made between available analytical techniques, results being assessed under operational conditions. Once a user has selected a suitable method of analysis, the factors likely to control the accuracy of the information produced are monitored during processing and likely tolerance limits are given for output values. (Murphy-FIRL)
W74-10941

WARM FOG AREA SEEDING STUDIES,
Meteorology Research, Inc., Altadena, Calif.
For primary bibliographic entry see Field 3B.
W74-11032

CAUSES FOR PRECIPITATION INCREASES IN THE HILLS OF SOUTHERN ILLINOIS,
Illinois State Water Survey, Urbana.
D. M. A. Jones, F. A. Huff, and S. A. Changnon, Jr.
Report of Investigation 75, 1974. 36 p, 33 fig, 16 tab, 20 ref. NSF Grant GA-19494.

Descriptors: *Precipitation(Atmospheric), *Illinois, *Climatology, *Meteorology, Evapotranspiration, Nucleation, Clouds, Diurnal distribution, Winds, Topography, Seasonal, Rainfall, Weather patterns.
Identifiers: *Shawnee Hills(IL), Hill effect, Diurnal differences, Radar echoes.

Three major studies show that the hill enhancement of precipitation is the addition of moisture due to greater evapotranspiration from the forested hills and the convergent wind field created over the western hills caused by the configuration of the hills and valleys. Three methods differing in scale and time were used to delineate the hill anomaly and to determine the reasons for it. First, a series of climatic studies of precipitation distribution considering daily, monthly, and seasonal data for comparison of hill and flatland stations were performed during 1960-1963. Second, a 5-year project involving analysis of data from a special raingage network on the basis of in-

dividual rain periods, months, and seasons during 1965-1969 was planned to define the areal extent of the hill high. Third, the results of these two studies were used to design a 1-month field study involving a weather radar, 3 cloud cameras, 5 weather (temperature-humidity) stations, 1 pilot balloon site, and aircraft sampling flights. (Humphreys-ISWS)
W74-11138

WARM FOG DISPERSAL TECHNIQUES,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-11200

A SUMMARY OF THE U.S. NAVY PROGRAM AND FY 1970 PROGRESS IN WEATHER MODIFICATION AND CONTROL.
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-11203

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
For primary bibliographic entry see Field 3B.
W74-11229

EROSIONAL AND DEPOSITIONAL ASPECTS OF HURRICANE CAMILLE IN VIRGINIA, 1969,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2J.
W74-11233

SEVENTH ANNUAL SURVEY REPORT ON THE AIR WEATHER SERVICE WEATHER MODIFICATION PROGRAM (FY 1974),
Air Weather Service, Washington, D.C.
For primary bibliographic entry see Field 3B.
W74-11433

2C. Snow, Ice, and Frost

METHOD OF CLEARING A PATH THROUGH ICE,
Global Marine Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 8C.
W74-11051

AN EMPIRICAL INTERMOLECULAR POTENTIAL ENERGY FUNCTION FOR WATER,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W74-11106

ROLE OF THE ENVIRONMENT IN THE FORMATION OF DENSITY DYNAMICS OF THE MUSKRAT OF YAKUTSK, (IN RUSSIAN),
Akademiya Nauk SSSR, Yakutsk. Institut Biologii.
Yu. V. Labutin, and M. V. Popov.
Ekologiya. Vol 4, No 3, p 70-76, 1973. Illus.

Descriptors: *Animal populations.
Identifiers: Muskrat, Ondatra zibethica, Trapping, Yakutsk(USSR).

The most important environmental factors determining the density dynamics of the muskrat (Ondatra zibethica) in Yakutia, USSR are the weather conditions, hydrologic regime of the waters and trapping. The most significant of the abiotic factors is freezing of the waters, since the subglacial mode of life of the muskrat in Yakutia lasts about 8 mo. (Oct-May). Rigorous winters with little snow lead to freezing of the shallow feeding areas of the waters and cause a drop in the numbers of the muskrat. High floods and droughts have the same effect. Trapping in 1963-64 amounted to about 200,000 pelts.--Copyright 1974, Biological Abstracts, Inc.
W74-11198

CATALOG OF USSR GLACIERS. VOLUME 16. ANGARA-YENISEY REGION. NO. 1. YENISEY. PARTS 3-5. NO. 2. ANGARA. PART 1. (KATALOG LEDNIKOV SSSR. TOM 16. ANGARO-YENISEYSKIY RAYON. VYPUSK 1. YENISEY. CHASTI 3-5. VYPUSK 2. ANGARA. CHAST' 1),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
V. I. Sil'nitskaya, and L. P. Chernova.
Gidrometeoizdat, Leningrad, 1973. 64 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Firn, Runoff, Ablation, Glacial drift, River basins, Stations, Investigations, Publications, Maps.
Identifiers: *USSR, *Angara River(USSR), *Yenisey River(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Angara-Yenisey Region in East Siberia. Areas covered are the Kazyr and Kan River basins, Kemchik River basin, the basin in upper reaches of the Yenisey River upstream from the mouth of the Kemchik River, and basins in upper reaches of the Oka and Uda Rivers. Attention is focused on glacier-surface characteristics which influence river regime and amount and distribution of runoff through time. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations in the vicinity of glaciers are tabulated. All parts of the 'Catalog of USSR Glaciers' were compiled at the Department of Glaciology of the USSR Academy of Science's Institute of Geography. (Josefson-USGS)
W74-11213

CATALOG OF USSR GLACIERS. VOLUME 15. ALTAY AND WEST SIBERIA. NO. 1. GORNYY ALTAY AND UPPER IRTYSH. PART 6. CHUYA RIVER BASIN (KATALOG LEDNIKOV SSSR. TOM 15. ALTAY I ZAPADNAYA SIBIR'. VYPUSK 1. GORNYY ALTAY I VERKHNIY IRTYSH. CHAST' 6. BASSEYN R. CHUI),
Tomsk State Univ. (USSR).
M. A. Dushkin.
Gidrometeoizdat, Leningrad, 1974. 60 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Snowpacks, Firn, Runoff, Ablation, Melting, Glacial drift, River basins, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Altay Territory), *Gorno-Altaysk Autonomous ' Oblast(USSR), *Irtysh River(USSR), *Chuya River basin(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Chuya River basin in southern Gorno-Altaysk Autonomous Oblast in the Altay Territory. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 6 of the 'Catalog of USSR Glaciers' was compiled at the Department of Glaciology of Tomsk State University in 1965-69. (Josefson-USGS)
W74-11214

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 3. AMU-DAR'YA. PART 6. SURKHOB RIVER BASIN BETWEEN MOUTHS OF THE OBIKHINGOU AND MUKSU RIVERS (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 3. AMU-DAR'YA. CHAST' 6. BASSEYN R. SURKHOB MEZHDU UST'YAMI REK OBIKHINGOU I MUKSU),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
G. M. Varnakova, and O. V. Rototayeva.
Gidrometeoizdat, Leningrad, 1971. 91 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Snowpacks, Firn, Runoff, Ablation, River basins, Tributaries, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Amu-Dar'ya River(USSR), *Surkhob River basin(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Surkhob River basin between mouths of the Obikhingou and Muksu Rivers in the western part of the Pamir-Alay Mountains. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 6 of the 'Catalog of USSR Glaciers' was compiled at the Department of Glaciology of the USSR Academy of Science's Institute of Geography. (Josefson-USGS)
W74-11215

CATALOG OF USSR GLACIERS. VOLUME 8. NORTHERN CAUCASUS. PART 6. CHEGEM RIVER BASIN. PART 7. CHEREK RIVER BASIN(KATALOG LEDNIKOV SSSR. TOM 8. SEVERNYY KAVKAZ. CHAST' 6. BASSEYN R. CHEGEMA. CHAST' 7. BASSEYN R. CHEREKA),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
V. D. Panov, and T. V. Psareva.
Gidrometeoizdat, Leningrad, 1973. 96 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Snowpacks, Firn, Runoff, Ablation, River basins, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Caucasus Mountains region), *Chegem River basin(USSR), *Cherek River basin(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Chegem and Cherek River basins in the Northern Caucasus. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 6 and 7 of the catalog of USSR Glaciers' were compiled at the Northern Caucasian Administration of the Hydrometeorological Service and at the Department of Glaciology of the USSR Academy of Science's Institute of Geography. (Josefson-USGS)
W74-11216

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO 1. SYRDAR'YA. PART 4. (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 1. SYR-DAR'YA. CHAST' 4.),
V. I. Sysenko, Yu. P. Barbat, and L. G. Cherkasov.
Gidrometeoizdat, Leningrad, 1973. 60 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Snowpacks, Runoff, Glacial drift, River basins, Tributaries, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Syrdar'ya River(USSR), *Naryn River(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in

basins of right-bank tributaries of the Naryn River from mouth of the Kekemeren River to mouth of the Malyy Naryn in Soviet Central Asia. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 4 of the 'Catalog of USSR Glaciers' was compiled by workers of the snow-survey and hydrographic party of the Kirgiz Administration of the Hydrometeorological Service. (Josefson-USGS)
W74-11217

CATALOG OF USSR GLACIERS. VOLUME 17. LENA-INDIGIRKA REGION. NO. 2. MIDDLE LENA. PART 1; NO. 5. LOWER LENA. PART 2. (KATALOG LEDNIKOV SSSR. TOM 17. LENSKO-INDIGIRSKIY RAYON. VYPUSK 2. SREDNYAYA LENA. CHAST' 1; VYPUSK 5. NIZHNYAYA LENA. CHAST' 2.),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
Z. S. Novikova, A. M. Grinberg, and D. K. Bashlavin.
Gidrometeoizdat, Leningrad, 1972. 44 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Snowpacks, Firn, Ablation, River basin, Stations, Investigations, Publications, Maps.
Identifiers: *USSR, *Lena River(USSR), *Chara River basin(USSR), *Vitim River basin(USSR), Orulgan Mountains(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Chara and Vitim River basins (Kodar Mountains) and in the Orulgan Mountains in the Lena-Indigirka Region in East Siberia. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations in the vicinity of glaciers are tabulated. Part 1 of the 'Catalog of USSR Glaciers' was compiled at the Department of Glaciology of the USSR Academy of Science's Institute of Geography, and Part 2 was compiled by workers at the All-Union Aerogeological Trust of the USSR Ministry of Geology. (Josefson-USGS)
W74-11218

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 2. KIRGIZIA. PART 3. BASIN IN UPPER REACHES OF THE CHU RIVER (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 2. KIRGIZIYA. CHAST' 3. BASSEYN VERKHOV'YEV R. CHU),
V. A. Cheban, and A. A. Yablokov.
Gidrometeoizdat, Leningrad, 1971. 56 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Snowpacks, Firn, Runoff, Ablation, Melting, River basins, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Kirgiz SSR, *Chu River(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the basin of upper reaches of the Chu River in northern Kirgiz SSR. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 3 of the 'Catalog of USSR Glaciers' was compiled by workers of the snow-survey and hydrographic party of the Kirgiz Administration of the Hydrometeorological Service. (Josefson-USGS)
W74-11219

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 1. SYRDAR'YA. PART 6. ATBASHI RIVER BASIN (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 1. SYRDAR'YA. CHAST' 6. BASSEYN R. ATBASHI),
N. P. Prokopova, and V. P. Fateyev.
Gidrometeoizdat, Leningrad, 1974. 48 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Firn, Runoff, Ablation, Glacial drift, River basins, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Syrdar'ya River(USSR), *Atbashi River basin(USSR).

Geographic location, morphology, climatic conditions, and regime of glaciers were investigated in the Atbashi River basin in Soviet Central Asia. Basic glacier data on 284 glaciers covering 113.7 sq km, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 6 of the 'Catalog of USSR Glaciers' was compiled by workers of the snow-survey and hydrographic party of the Kirgiz Administration of the Hydrometeorological Service. (Josefson-USGS)
W74-11220

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 2. KIRGIZIA. PART 2. BASINS OF LEFT-BANK TRIBUTARIES OF THE CHU RIVER DOWNSTREAM FROM MOUTH OF THE KOMORCHEK RIVER (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAVA AZIYA. VYPUSK 2. KIRGIZIYA. CHAST' 2. BASSEYNY LEVYKH PRITOKOV R. CHU NIZNE USTYA R. KOMORCHEK),
Leningrad State Pedagogical Inst. (USSR).
Ye. V. Maksimov, and V. Ya. Bazheva.
Gidrometeoizdat, Leningrad, 1973. 71 p.

Descriptors: *Glaciers, *Data collections, Glaciation, Climatology, Geomorphology, Ice, Firn, Ablation, Melting, Glacial drift, River basins, Tributaries, Stations, Precipitation gages, Investigations, Publications, Maps.
Identifiers: *USSR(Central Asia), *Kirgiz SSR, *Chu River(USSR).

Geographic location, climatic conditions, morphology, and regime of glaciers were investigated on northern slopes of the Kirgiz Alatau in Soviet Central Asia. Special attention was given to buried glaciers and to glacier termini covered by a thick layer of fragmental material. Basic glacier data, onsite and station glacier investigations, and lists of pertinent glacier publications and of hydrometeorological stations and precipitation gages in the vicinity of glaciers are tabulated. Part 2 of the 'Catalog of USSR Glaciers' was compiled at the Department of Geography of Leningrad State Pedagogical Institute im. A.I. Gertsen and at the Department of Glaciology of the USSR Academy of Science's Institute of Geography. (Josefson-USGS)
W74-11221

NORTH CASCADES HIGHWAY SR-20 AVALANCHE ATLAS,
Washington Univ., Seattle. Dept. of Civil Engineering.
E. R. La Chapelle, and R. Leonard.
Available from NTIS, Springfield, Va 22161 as PB-220 336, Price $3.00 printed copy; $2.25 microfiche. Report for Washington State Highway Commission, June 1971. 175 p.

Descriptors: *Avalanches, *Highways, Roads, *Washington, Hazards, *Maps, Mapping, *Data collections.
Identifiers: *North Cascades Highway(Wash).

This Avalanche Atlas catalogs details of snow avalanche activity along the North Cascades Highway, Washington, SR-20, between Newhalem on the west side of the Cascade Mountains and Mazama on the east side. The Atlas, prepared in loose-leaf form, is designed primarily as an operational guide for Highway Department maintenance personnel who will be involved in snow removal operations on SR-20. Each avalanche path is outlined on annotated maps and photographs. Normally, this outline indicates the maximum recognizable extent of past avalanche activity on each path. The hazard rating given on each Summary Sheet is a subjective estimate of the encounter probability between a falling avalanche and moving highway traffic. (Knapp-USGS)
W74-11226

EVALUATION OF GLACIER MASS BALANCE BY OBSERVING VARIATIONS IN TRANSIENT SNOWLINE POSITIONS,
Norwegian Water Resources and Electricity Board, Oslo.
G. Ostrem.
Available from NTIS, Springfield, Va., 22161 as N74-13055, Price $3.00 printed copy; $2.25 microfiche. Report 376 for The Royal Norwegian Council for Scientific and Industrial Research (NTNF), October 1973. 8 p, 3 fig, 1 tab, 3 ref.

Descriptors: *Glaciers, *Water balance, *Remote sensing, Snowpacks, Satellites(Artificial), Snow surveys, Snow cover, Mountains, Glaciohydrology.
Identifiers: *Snowline, *Norway.

The position of the transient snowline on glaciers in South Norway was studied by remote sensing to evaluate glacier mass balance at glaciers where no direct observations are made. The height of the transient snowline on glaciers is closely tied to the mass balance; it will reach higher altitudes in years of negative mass balance, when rivers gain extra amounts of melt water from glacier retreat. The correlation between snowline heights and glacier mass balance is known for eight glaciers in South Norway; repeated satellite imagery can be used both to extrapolate similar information to a large number of glaciers and to estimate the mass balance for a great number of glaciers at the end of any melt season. (Knapp-USGS)
W74-11437

AVALANCHES ON THE NORTH CASCADES HIGHWAY (SR-20)--SUMMARY REPORT,
Washington Univ., Seattle. Dept. of Civil Engineering.
E. R. La Chapelle, and C. B. Brown.
Available from NTIS, Springfield, Va. 22161 as PB-220 337, Price $3.00 printed copy; $2.25 microfiche. Washington University Geophysics Program and Department of Civil Engineering Report for Washington State Highway Commission, September 1971. 65 p, 7 fig, 2 tab.

Descriptors: *Avalanches, *Highways, *Washington, *Roads, Hazards, Data collections, Safety.
Identifiers: *North Cascades Highway(WA).

Snow and avalanche climate varies widely across the parts of the Cascade Mountains of Washington. Little information is presently available about temperatures and weather patterns over the passes, but a limited amount of snow depth data are available from snow courses. These snow data are presented and analyzed. Several distinct zones of avalanche activity extend form Newhalem on the west to Early Winters Creek on the east. These zones each have distinct types of avalanche occurrence and patterns of hazard for the highway. Periods of high hazard for different zones do not coincide in time. Due to the wilderness nature of the highway and lack of public facilities, the whole highway probably has to be closed each time hazard develops in any one zone. The most serious danger from avalanches exists in the Liberty Bell and Cutthroat Ridge zones between Washington

Pass and Cutthroat Creek. The recommended method of dealing with avalanche hazards on SR-20 is management of traffic flow, closures, and artificial avalanche release. The percentage of time the highway can be kept open in the winter depends on a trade-off with costs and desired level of public safety. In general, a decrease in closure time can be obtained only at the price of increasingly complex and costly avalanche control. Reducing closure time lower than 15%-20% does not presently appear feasible. This level of operation will be possible only after several years of experience. (Knapp-USGS)
W74-11444

INVESTIGATION AND CALCULATION OF ICE JAMS (ISSLEDOVANIYE I RASCHETY ZATOROV I ZAZHOROV L'DA).
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 219, Chizhov, A. N., editor, Leningrad, 1974. 87 p.

Descriptors: *Ice, *Ice cover, *Ice jams, *Rivers, Ice breakup, Ice loads, Melting, Water levels, Hydroelectric plants, Tailwater, Model studies, Meteorology, Aerial photography, Equations.
Identifiers: *USSR(Dniester River).

Problems of ice jams on rivers were investigated in this collection of 6 papers prepared by the State Hydrologic Institute in Leningrad. Titles of individual papers are: (1) formation of ice jams on the Dniester River; (2) investigation of stability of ice cover on the Dniester in spring; (3) model studies of ice-jam formation for justification of a method of ice retention on the Dniester and for determination of ice loads; (4) ice-jam formation patterns in tailwater channels of hydroelectric powerplants; (5) model studies of ice movement under ice cover; and (6) use of aerial surveys for investigation of ice jams. (Josefson-USGS)
W74-11445

GLACIOHYDROCLIMATOLOGY OF MOUNTAINOUS COUNTRIES (GLYATSIOGIDROKLIMATOLOGIYA GORNYKH STRAN).
Mezhduvedomstvennyy Geofizicheskiy Komitet pri Presidiume Akademii Nauk SSSR, Glyatsiologicheskiye Issledovaniya, No 24, Izdatel'stvo 'Nauka', Moscow, Kotlyakov, V.M., editor, 1973. 200 p.

Descriptors: *Glaciology, *Glaciohydrology, *Climatology, *Mountains, Regions, Basins, Glaciers, Glaciation, Alpine, Hydrologic cycle, Runoff, Ablation, Melting, Snowmelt, Snowpacks, Snow surveys, Meteorology, Precipitation(Atmospheric), Temperature, Winds.
Identifiers: *USSR, Caucasus, Soviet Central Asia, Altay Territory, Glacier mass budget.

This collection contains 26 papers prepared on the basis of reports presented at the Fourth All-Union Symposium on Glaciology held at Terskol in 1968. Investigations on glaciohydrology and climatology of mountainous countries are currently extensively conducted in the USSR in mountains of the Caucasus, Soviet Central Asia, and Altay after the framework of the International Hydrological Decade. Published results are of theoretical importance for calculating water balance of mountain-glacier basins and of practical importance with regard to water-resources use in mountainous regions. (Josefson-USGS)
W74-11446

2D. Evaporation and Transpiration

PHYSIOLOGICAL CHARACTERISTICS OF TREES AND SHRUBS CULTIVATED IN THE SOUTHERN STEPPES OF THE UKRAINE, (IN RUSSIAN),
B. F. Morozov.
Tr Kishinev S-Kh Inst. 93. p 86-93. 1972.

Descriptors: *Transpiration, Plant physiology.
Identifiers: Almond, Apricot, Cherry, Forestation, Honey locust, Mahaleb cherry, Russian olive.

Under the arid conditions of the southern steppes of the Ukraine (USSR) mesophytes having comparatively better water exchange and enduring profound changes in protein metabolism are the most suitable shrubs and trees for field protection afforestation. Such plants include honey locust, Russian olive, apricot, Mahaleb cherry, and almond. Tables of the moisture content of the soil in Aug. at the boundary of the II A and III A agroclimatic regions (in the vicinity of Gvardeiskoe, Crimea), of moisture content of the leaves and transpiration rate of 10 tree species, sugar content in the leaves of 14 ssp., and of content of protein N in leaves are presented.--Copyright 1974, Biological Abstracts, Inc.
W74-11177

EVAPORATION OF WATER FROM SAND, 3: THE LOSS OF WATER INTO THE ATMOSPHERE FROM A SANDY RIVER BED UNDER ARID CLIMATIC CONDITIONS,
National Inst. for Water Research, Windhoek (South West Africa).
D. H. R. Hellwig.
Journal of Hydrology, Vol 18, No 3/4, p 305-316, March, 1973. 2 fig, 5 tab, 17 ref.

Descriptors: *Evaporation, *Evapotranspiration, Consumptive use, *Water loss, Phreatophytes, *Arid climates, *Sands.

The Penman formula was applied to calculate evaporation and evapotranspiration losses under arid climatic conditions from a sandy river bed. Good agreement with measured results was obtained. The loss of water into the atmosphere from a river bed covering 8300 ha was estimated to be 76 million cu m/y. Evapotranspiration contributed 68% and permanently wet areas 19.5% to the total water loss. The rest evaporated from temporary wet areas. Substantial volumes of water can possibly be gained by the removal of phreatophytes. (See W73-07055, W73-07056 and W74-11267) (Skogerboe-Colorado State)
W74-11266

EVAPORATION OF WATER FROM SAND, 4: THE INFLUENCE OF THE DEPTH OF THE WATER-TABLE AND THE PARTICLE SIZE DISTRIBUTION OF THE SAND,
National Inst. of Water Research, Windhoek (South West Africa).
D. H. R. Hellwig.
Journal of Hydrology, Vol 18, No 3/4, p 317-327, March, 1973. 6 fig, 5 tab, 11 ref.

Descriptors: *Evaporation, *Consumptive use, Water loss, Acid climates, *Water table, Depth, Groundwater, *Particle size, *Sands.

Experiments were carried out to determine the influence of the depth of the water-table and the particle size of sand on evaporation of water from sand. Dropping the water table in sand, with a mean diameter of 0.53 mm, below 60 cm will practically prevent evaporation losses. The coarseness of the sand does not affect evaporation if the water table is kept at the sand surface. If the water table is kept below the sand surface, evaporation decreases with the coarseness of the sand and with the depth of the water table. Evaporation from an open water surface was 8% higher than from water-saturated sand, most probably due to higher energy storage in a body of water resulting in a greater temperature gradient between the evaporation surface of the water and the air during the night, as compared to a water-saturated sand. (See W74-11266) (Skogerboe-Colorado State)
W74-11267

A WEIGHING SYSTEM FOR LYSIMETERS,
Department of Agriculture, Ottawa (Ontario). Engineering Research Service.
P. W. Voisey, and E. W. Hobbs.
Canadian Agricultural Engineering, Vol 14, No 2, p 82-84, December, 1972. 3 fig, 25 ref.

Descriptors: *Lysimeters, *Weight, *Evapotranspiration, Soil moisture, Soilwater, Consumptive use, Soilwater-plant relationships.

A technique is described for weighing lysimeters using a strain gage load cell and an electronic indicating system. The nominal weight of the lysimeter is eliminated from the measurement by offsetting the indicator zero electrically using a weight. This increases the possible resolution and accuracy of measurement. In the example described, weight changes of plus or minus 22.7 kg in lysimeters weighing 180 kg with a resolution of 0.045 kg and accurate within 0.090 kg were measured. Weighing of 36 such lysimeters could be accomplished in two hours. (Skogerboe-Colorado State)
W74-11277

A NEW ECOPHYSIOLOGICAL APPROACH TO FOREST-WATER RELATIONSHIPS IN ARID CLIMATES,
For primary bibliographic entry see Field 2I.
W74-11386

RATE OF EVAPORATION OF WATER FROM CAPILLARIES OF DIFFERENT DIAMETER INTO MOIST AIR (SKOROST' ISPARENIYA VODY IZ KAPILLYAROV RAZNYKH DIAMETROV VO VLAZHNYY VOZDUKH),
Akademiya Nauk SSSR, Moscow. Institut Fizicheskoi Khimii.
N. V. Churayev, and N. Ye. Yashchenko.
Pochvovedeniye, No 9, p 105-112, September 1973. 4 fig, 18 ref.

Descriptors: *Soil physics, *Evaporation, *Air-water interfaces, *Capillary action, *Films, Diffusion, Humidity, Vapor pressure, Isotherms, Surfaces, Quartz, Instrumentation, Measurement, Curves, Equations.
Identifiers: USSR.

Patterns of evaporation of water from capillaries into moist air and of evaporation into a vapor-unsaturated atmosphere are determined by the type of isotherms of disjoining water-film pressure on a quartz surface. Formation of a beta water film near the meniscus results in displacement of the evaporation area in a capillary by a value which increases as the capillary radius decreases. The flow of polymolecular alpha films along a capillary surface produces an increase in effective diffusion coefficients as compared to coefficients of molecular vapor diffusion through air. The effect of film flow can be observed experimentally at a humidity of 0.86 in capillaries with radii less than 10 microns and at a humidity of 0.96 in capillaries with radii less than 20 microns. The contribution of film transport is noticeable only at humidity values approaching unity and in fine capillaries. Possibilities of varying the rate of evaporation of water from capillaries by suppressing or intensifying film transport are examined. (Josefson-USGS)
W74-11448

2E. Streamflow and Runoff

THE EFFECT OF HYDROMETEOROLOGICAL CONDITIONS ON THE ZETA-POTENTIAL OF SUSPENDED SOLIDS (HIDROMETEOROLOGIAI VISZONYOK

HATASA A LEBEGO ANYAGOK ZETA-POTENCIALJARA),
For primary bibliographic entry see Field 5B.
W74-10907

A FINITE ELEMENT APPROACH TO WATERSHED RUNOFF,
University Coll. of Swansea (Wales). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10937

NEW ANALYTICAL SOLUTIONS FOR DYE DIFFUSION EQUATIONS,
Princeton Univ., N.J. Water Resources Program.
R. W. Cleary, and D. D. Adrian.
Journal of the Environmental Engineering Division, American Society of Civil Engineers Vol 99, No EE3, Paper 9770, p 213-227, June 1973. 3 fig, 1 tab, 21 ref, append. OWRR A-041-MASS(2).

Descriptors: *Dye dispersion, *Dye releases, *Equations, *Diffusion, *Dispersion, Boundary processes, Open channel flow, Turbulent flow, Mixing, Mathematical models, Streamflow.

Partial differential equations describing the concentration distribution of a tracer dye released as an instantaneous source (line or point) subject to no-flux boundary conditions at the river bottom, surface, and banks were derived analytically using integral transform methods. The river is considered finite in the vertical and lateral directions, the dye source location is arbitrary, and the results represent two- and three-dimensional analytical solutions of tracer modeling and include the boundary effects of the river. The solutions have particular application in the calculation of turbulent diffusion coefficients in two and three dimensions. (Knapp-USGS)
W74-11021

RIVER MILE INDEX--VIRGIN RIVER BASIN, ARIZONA, NEVADA, UTAH.
Bureau of Reclamation, Boulder City, Nev., Region 3.
Pacific Southwest Inter-Agency Committee, Water Management Sub-Committee Report, March 1974. 21 p, 2 map.

Descriptors: *Rivers, *Nevada, *Utah, Arizona, Mapping, Tributaries, River basins, Geographical regions.
Identifiers: *River mile index, *Virgin River(Utah), *Muddy River(Utah).

This river mile index for the Virgin and Muddy Rivers in southern Nevada and Utah and the northwestern tip of Arizona is one of a series of reports to be issued for stream basins in the Pacific Southwest. River mileages were determined from measurements made on U.S. Geological Survey topographic quadrangles. The U.S. Geological Survey furnished information on stream gage locations, drainage areas, and water elevations at key points. River mile distances were measured upstream from the mouth to the nearest tenth mile. Tributaries are shown as entering from the right or left from a position facing downstream. (Knapp-USGS)
W74-11030

LONG WAVE EXCITATION IN HARBOURS--AN ANALYTICAL STUDY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11031

LARCH LITTER REMOVAL HAS NO SIGNIFICANT EFFECT ON RUNOFF,
Forest Service (USDA), La Crosse, Wis. Watershed Lab.
R. S. Sartz, and D. N. Tolsted.
USDA Forest Service/Research Note NC-163, 1974, 2 p, 1 tab, 3 ref.

Descriptors: *Runoff, *Litter, *Overland flow, *Forest watersheds, Leaves, Infiltration, Forest soils, Coniferous forests.
Identifiers: Larch trees.

Runoff was measured in an 11-year-old plantation of European larch (Larix decidua) on paired plots from which litter had either been or not been removed. On five of the six pairs, the plot on which litter had been left intact yielded more runoff, but the differences were neither statistically nor hydrologically significant. (Brown-IPC)
W74-11071

ROUGHNESS COEFFICIENTS OF VEGETATED FLOOD PLAINS,
Ministry of Transport and Waterways, the Hague (Netherlands). Maas-River Study Div.
G. J. Klaassen, and Zwaard J. J. Van Der.
Journal of Hydraulic Research, Vol 12, No 1, p 43-63, 1974. 20 fig, 7 ref.

Descriptors: *Roughness(Hydraulic), *Roughness coefficient, *Flood plains, Rivers, Flow resistance, Overland flow, River flow, Flow characteristics, Trees, *Chezy equation, Hydraulic models, Model studies.
Identifiers: *Vegetated flood plains, *Netherlands(River Mass), Hedges.

A model study was conducted on the hydraulic resistance of hedges and fruit trees which are common in the flood plain of the River Maas. The hedges, which grow to a height of 2 to 4 m, serve as partitions between plots of agricultural land. The fruit trees grow to a height of 2.5 to 3 m. A full-scale study using hedges from the flood plain of the Maas was made. The resistance of fruit trees was studied on a 1 to 10 scale. The Chezy coefficient of the flood plain was especially influenced by the spacing of the hedges, the number of trees per unit area in an orchard and by the water level over the flood plain. Removal of vegetation resulted in lower water levels and smaller mean current velocities in the summer bed and can, therefore, be useful as a means to compensate unfavorable effects caused by river-works in the flood plain. A graph is given showing the variation of Chezy coefficient with water depth and hedge spacing for flood plains. Another graph shows the variation of Chezy coefficient with water depth and number of fruit trees per unit area for flood plains. (Humphreys-ISWS)
W74-11136

VARIED FLOW FUNCTIONS FOR ELLIPTIC CHANNELS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 8B.
W74-11139

INTRODUCTION TO THE FAUNISTIC STUDY OF DIPTERA IN A STREAM FROM THE PYRENEES NEAR THE ATLANTIC COAST: THE LISSURAGA, (IN FRENCH),
Station d'Hydrobiologie Continentale, Biarritz (France).
A. Neveu.
Ann Hydrobiol. Vol 3, No 2, p 173-196. 1972. Illus. English summary.

Descriptors: *Diptera, Aquatic insects.
Identifiers: Chironomidae, France, Lissuraga, Pyrenees, Salmonidae, Simuliidae.

A study carried on in a stream in the Pyrenees-Atlantiques (France) elucidated the part played by insects with aquatic larvae in the food of Salmonidae. Results for Diptera are presented. A first analysis showed the efficiency of capture methods on the various families, a preliminary condition to a more quantitative evaluation. The study of the faunistic composition showed the numerical size of 2 Diptera families: Chironomidae and Simuliidae, which make up 80-90% of the faunistic stock. The composition varies according to biotopes, in particular with regard to the location on the stream and to the substratum. Different stations have thus been studied over 5 km of stream, with regular samplings during 3 yr in various facies conditions. Density variations in stocks of Diptera larvae in time and space were shown. Populations were important in spring and autumn; in winter, sudden floods reduce them and in summer too warm waters slow down development, and result in a lack of micro-organisms. Fluctuations in stocks and their low enough mean level, due to excessively well-wooded banks, allow an explanation for the slow growth of Salmonidae in this stream to be formulated. It is thus possible to make a connection between the periods of fish growth and the presence of large populations of Diptera larvae.--Copyright 1974, Biological Abstracts, Inc.
W74-11179

FALL INCREASE OF THE POPULATION OF AQUATIC MITES IN THE MOUTHS OF RIVERS AND STREAMS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
P. V. Tuzovskii.
Biol Vnutr Vod Inform Byull. 15. p 48-49. 1972.

Descriptors: *Mites, Aquatic insects.
Identifiers: Forella variegator, Mideopsis orbicularis, Insect populations.

Aquatic mites were counted every 10 days in the mouth of the Krasnoe stream near Borok (Rybinsk reservoir) (USSR) by means of a Mordukhai-Boltovskii tubular bottomgrab. Fourteen species were recorded. Beginning with the third wk. of Sept. there was a marked increase of the population of mites from 825 to 39,400 specimens/m2 with a subsequent equally marked drop beginning in the third wk. of Oct. Forella variegator and Mideopsis orbicularis dominated (respectively 47.1 and 17.8% of the total number of mites). Such a high population was probably due to the concentration of mites on the muddy bottom of the stream as the level of the reservoir was drawn down. Then the mites withdrew from the receding water and migrated deep into the body of water. Vast quantities of predaceous mites can have a substantial role in regulating the population of certain groups of invertebrates.--Copyright 1974, Biological Abstracts, Inc.
W74-11181

OLIGOCHAETA IN THE INTERSTITIAL WATERS, (IN POLISH),
Polish Academy of Sciences, Poznan. Inst. of Zoology.
K. Kasprzak.
Przegl Zool. Vol 17, No 1, p 41-44, 1973. Illus. English summary.
Identifiers: Enchytraeidae, Naididae, Oligochaeta, Tubificidae, Insect populations.

The structure of a community of Oligochaeta inhabiting interstitial waters of rivers and streams of southern Poland was characterized. The community was well defined and presented a remarkable structure of domination characterized by a small number of dominating species and a considerable number of accidental ones. Of the families of Oligochaeta occurring in this environment, Naididae, Tubificidae and Enchytraeidae dominated.--Copyright 1974, Biological Abstracts, Inc.
W74-11199

AUTOCORRELATION STRUCTURE OF MONTHLY STREAMFLOWS,
Geological Survey, Reston, Va. Water Resources Div.

M. E. Moss, and M. C. Bryson.
Water Resources Research, Vol 10, No 4, p 737-744, August 1974. 10 fig, 1 tab, 15 ref.

Descriptors: *Correlation analysis, *Streamflow, *Mathematical models, *Time series analysis, Base flow, Variability, Stochastic processes, Simulation analysis, Statistical models.
Identifiers: *Autocorrelation.

The autocorrelation structure of monthly streamflows, a nonstationary process, was developed from a mathematical model that assumes that monthly precipitation is an independent series and that the base flow of the stream is derived from a linear aquifer. Under these assumptions the first-order autocorrelation coefficients of streamflow vary seasonally, as do other statistics such as monthly means and standard deviations. Comparison of the autocorrelation coefficients predicted by the model with those computed from an actual streamflow record of 58 years indicates that the seasonality of streamflow is well represented by the model. (Knapp-USGS)
W74-11419

GENERALIZED SKEW COEFFICIENTS OF ANNUAL FLOODS IN THE UNITED STATES AND THEIR APPLICATION,
Geological Survey, Reston, Va.
C. H. Hardison.
Water Resources Research, Vol 10, No 4, p 745-752, August 1974, 3 fig, 4 tab, 5 ref.

Descriptors: *Floods, *United States, *Frequency curves, *Flood frequency, *Frequency analysis, Probability, Statistics, Peak discharge, Time series analysis.

Generalized skew coefficients for use in defining flood-frequency curves that follow log Pearson type 3 distributions are shown by isopleths on a map of conterminous United States. The generalized logarithmic skiw coefficients range from 0.6 along the eastern seaboard to -0.5 in Indiana and Illinois. West of the one-hundredth meridian the coefficients range from -0.3 to 0.2 except for a small area in Nebraska where the generalized skew goes as high as 0.4. The validity of the map values is verified by a split-sampling procedure. In the west the discharge of 50- and 100-yr peaks computed by using map values of skew is more accurate than that computed by using the observed skew of a sample of 30 annual peaks. East of the Mississippi River the accuracy is even higher and approaches the equivalent of 60 annual peaks along the east coast. An equation gives the adjustment by which a T-yr peak computed by using map skew would have to be increased to give a discharge that has an average exceedance probability equal to 1/T. (Knapp-USGS)
W74-11420

FLOOD PLAIN INFORMATION, HOADLEY CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11427

FLOOD PLAIN INFORMATION, WHIPPLE CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11428

FLOOD PLAIN INFORMATION, CARLANNA CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11429

FLOOD PLAIN INFORMATION, KETCHIKAN CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11430

RIVER MILE INDEX, SEVIER LAKE BASIN, UTAH AND MINOR BASINS IN WESTERN UTAH AND EASTERN NEVADA.
Forest Service (USDA), Ogden, Utah. Intermountain Region.
For primary bibliographic entry see Field 7C.
W74-11432

HYDROLOGIC DATA FOR MOUNTAIN CREEK, TRINITY RIVER BASIN, TEXAS, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-11441

HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-11442

SURFACE RUNOFF AND SOIL EROSION IN FOOTHILLS OF DAGESTAN (O POVERKHNOSTNOM STOKE I SMYVE POCHV V PREDGOR'YAKH DAGESTANA),
Dagestanskii Nauchno-Issledovatelskii Institut Selskogo Khozyaistva, Makhachkala (USSR).
For primary bibliographic entry see Field 2J.
W74-11450

2F. Groundwater

HYDROGEOLOGY OF THE USSR. VOLUME 15: BASHKIR ASSR (GIDROGEOLOGIYA SSSR. TOM XV. BASHKIRSKAYA ASSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, A. V. Sidorenko, editor-in-chief, 1972. 344 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater basins, *Aquifers, *Artesian aquifers, Confined water, Springs, Engineering geology, Geomorphology, Karst, Mountains, Structural geology, Stratigraphy, Geologic time, Water types, Water chemistry, Water utilization, Water supply, Water conservation, Natural resources.
Identifiers: *USSR(Bashkir ASSR), Tectonics.

Data summarized in Volume 15 in the series 'Hydrogeology of the USSR'(Bashkir ASSR) were based on small- and medium-scale surveys during a study of mineral deposits, groundwater regime and karst phenomena, and on geologic-engineering investigations and exploratory drilling for oil and gas. Physiographic conditions, geologic structure, and physio-geologic phenomena in the Republic are viewed as factors influencing the distribution and formation of groundwater. The Bashkir Republic is divided into two hydrogeologic regions: the Volga-Kama artesian basin and the basin containing interstitial waters of the Ural fold mountains. Twenty-five hydrostratigraphic units (aquifer horizons, aquifer complexes, and waters of sporadic occurrence) are identified in the Volga-Kama basin in deposits ranging in age from the Upper Proterozoic to the Quaternary. In the second region groundwater within the zone of regional fractures is analyzed on the basis of stratigraphic subdivisions represented by metamorphic and volcanogenic formations similar in hydrophysical properties and ranging in age from the Upper Proterozoic to the Carboniferous. Artesian waters are confined to carbonate rocks of the Upper Proterozoic, Carboniferous, and to loose formations dating from the Triassic to the Quaternary. Basic patterns in the formation, movement, and hydrochemical zonality of groundwater are given for these regions. Natural fresh groundwater resources and foreseeable supplies are computed for the Republic, and distribution of fresh groundwater in zoned. Problems of present and future groundwater use for water supply and of groundwater protection from depletion and contamination are discussed, and the role of groundwater in the development of mineral deposits is noted. (Josefson-USGS)
W74-11017

HYDROGEOLOGY OF THE USSR. VOLUME 29: KAMCHATKA, AND THE KURIL AND KOMANDORSKIYE ISLANDS (GIDROGEOLOGIYA SSSR. TOM XXIX. KAMCHATKA, KURIL'SKIYE I KOMANDORSKIYE OSTROVA).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, A. V. Sidorenko, editor, 1972. 364 p.

Descriptors: *Hydrogeology, *Groundwater, *Aquifers, *Engineering geology, Structural geology, Geomorphology, Seismology, Volcanoes, Gases, Water types, Freshwater, Mineral water, Thermal water, Geothermal studies, Hydrothermal studies, Water utilization, Water supply, Water conservation, Geologic mapping, Zoning.
Identifiers: *USSR(Kamchatka), *Kuril Islands(USSR), *Komandorskiye Islands(USSR), Tectonics, Balneology.

Volume 29 in the series 'Hydrogeology of the USSR' is the first summary work on the hydrogeology and engineering geology of Kamchatka, the Kurils, and Komandorskiye Islands. Kamchatka and the Kurils are the only regions of recent volcanism in the USSR and uniquely affect groundwater formation. A high degree of seismic activity and widespread development of recent tectonic disturbances, intensive mountain-building volcanic processes, and an intense geothermal regime have combined to produce extensively developed hydrothermal systems with numerous exposed sources of discharge of highly thermal waters, vapors, and gases. Besides a description of aquifer horizons, attention is directed to an examination of the patterns of distribution and formation of different types of thermal water in regions of active and extinct volcanoes. Maps, prepared on the basis of modern scientific concepts of the structural geology of Kamchatka, reflect the hydrogeologic zoning of major aquifer horizons and complexes of fresh and mineral waters and the distribution characteristics of different volcanic structures, hydrothermal systems, and artesian sedimentation basins. Natural freshwater resources and yield, present and future water supply, and balneological and thermal-energy resources are described, and characteristics and possibilities of groundwater use in prospecting for mineral deposits are examined. (Josefson-USGS)
W74-11018

HYDROGEOLOGY OF THE USSR. VOLUME 38: TURKMEN SSR (GIDROGEOLOGIYA SSSR. TOM XXXVIII. TURKMENSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, A. V. Sidorenko, editor-in-chief, 1972. 566 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater basins, *Aquifers, *Engineering geology, Geomorphology, Geologic mapping, Geologic time, Water utilization, Water supply, Water conservation, Water chemistry, Water analysis, Sampling, Water types, Confined water, Freshwater, Mineral water, Thermal water, Water wells.
Identifiers: *USSR(Turkmen SSR), Tectonics.

Volume 38 in the series 'Hydrogeology of the USSR' contains a detailed description of groundwater in the Turkmen SSR in Soviet Central Asia. Results are presented of long-term investigations of hydrogeologic and geologic-engineering conditions and of basic trends in groundwater use in the national economy of the Republic. A hydrogeologic map of the Republic at a scale of 1:1,500,000 and a catalog of chemical analysis of water samples are appended. (Josefson-USGS)
W74-11019

HYDROGEOLOGY OF THE USSR. VOLUME 40: KIRGIZ SSR (GIDROGEOLOGIYA SSSR. TOM XL. KIRGIZSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, A. V. Sidorenko, editor-in-chief, 1971. 488 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater resources, *Aquifers, *Engineering geology, Geomorphology, Structural geology, Geologic mapping, Stratigraphy, Geologic time, Water types, Mineral water, Industrial water, Thermal water, Confined water, Springs, Water wells, Water chemistry, Water utilization, Zoning.
Identifiers: *USSR(Kirgiz SSR), Tectonics.

Volume 40 in the series 'Hydrogeology of the USSR' is devoted to a description of hydrogeologic and engineering-geologic conditions in the Kirgiz SSR in Soviet Central Asia. A history of hydrogeologic and engineering-geologic investigations in the Republic covers a period from 1857 to the present. Basic factors influencing formation and distribution of groundwater include topography, hydrography, climate, soils and vegetation, lithology, tectonics, and geomorphology. Groundwater, including mineral, industrial, and thermal waters, is described, and role of groundwater resources in the national economy of the Republic is discussed. Two hydrogeologic provinces are identified: the Tien-Shan and Pamir-Alay, which are subdivided into regions and subregions representing specific types of artesian basins and hydrogeologic massifs. Special attention is given to the present state and prospects of groundwater use and to groundwater conservation and hydrogeology of mineral deposits. A catalog of wells and springs is appended. (Josefson-USGS)
W74-11020

AVAILABILITY OF GROUNDWATER IN THE LOWER PAWCATUCK RIVER BASIN, RHODE ISLAND,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11023

GROUNDWATER BASIC DATA FOR ADAMS AND BOWMAN COUNTIES, NORTH DAKOTA,
Geological Survey, Bismarck, N. Dak.
M. G. Croft.
North Dakota Water Commission County Ground-Water Studies 22--Part II and North Dakota Geological Survey Bulletin 65--Part II, 1974. 294 p, 2 fig, 2 plate, 9 tab, 25 ref.

Descriptors: *Basic data collections, *North Dakota, *Groundwater, *Hydrologic data, Water levels, Hydrogeology, Electrical well logging, Borehole geophysics, Water analysis, Trace elements, Aquifer characteristics, Hydraulic conductivity, Porosity.
Identifiers: Adams County(ND), Bowman County(ND).

Detailed geologic and hydrologic data were collected to use for the orderly development of water supplies for municipal, domestic, livestock, irrigation, and industrial uses in Adams and Bowman Counties, North Dakota. The data consist of geologic and hydrologic records for 910 wells and test holes; water-level measurements in 54 observation wells; lithologic and geophysical logs of 521 test holes and wells; 232 chemical analyses of groundwater; 68 chemical analyses of water from streams and reservoirs; five analyses of minor elements in water from wells and streams; three particle-size distribution graphs of sand from an aquifer; and 11 hydraulic conductivity and porosity values determined by laboratory tests. (Knapp-USGS)
W74-11024

WATER LEVELS IN ARTESIAN AND NONARTESIAN AQUIFERS OF FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4A.
W74-11025

METEORIC WATER IN MAGMAS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2K.
W74-11112

HYDROGEOLOGY OF GLACIAL DRIFT, MESABI IRON RANGE, NORTHEASTERN MINNESOTA,
Geological Survey, Washington, D.C.
T. C. Winter.
Available from GPO, Washington, D C 20402, Price $2.10 paper copy. Water-Supply Paper 2029-A, 1973. 23 p, 6 fig, 1 tab, 23 ref.

Descriptors: *Hydrogeology, *Glacial drift, *Minnesota, *Water yield, Till, Aquifers, Transmissivity, Gravels, Sands, Water resources, Hydrologic data.
Identifiers: *Mesabi Iron Range(Minn).

Stratified fluvial sediments occur within the glacial drift at many places in the Mesabi Iron Range area of Minnesota. These sediments, which are important aquifers, occur extensively between the three main till units. The thickest and most extensive aquifer lies between the surficial till and the middle till unit, the bouldery till. This stratigraphic interval is greater than 50 feet thick in much of the area, and transmissivity is greater than 100,000 gallons per day per foot in some places. Glaciofluvial sediments underlying the bouldery till occur in the western half of the area and are generally less than 50 feet thick, and transmissivity is generally less than 50,000 gallons per day per foot. Surficial glaciofluvial sediments are a sources of groundwater for high-yield wells only in the eastern part of the area. Thickness of these sediments is greater than 100 feet in some places, but transmissivity is generally less than 50,000 gallons per day per foot. Practical sustained yield of aquifers in glacial drift is estimated to be as much as 40 million gallons per day from known aquifers, and assuming that the ratio of area underlain by aquifer to total area is constant for the study area (about 20% where mapped in detail), as much as 80 million gallons per day could be developed from all glacial-drift aquifers. (Knapp-USGS)
W74-11222

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 10. PRINCIPLES OF GROUNDWATER HYDROLOGY,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11232

SOIL-SUCTION MEASUREMENTS FOR EVALUATION OF VERTICAL WATER FLOW AT GREATER DEPTHS WITH A PRESSURE TRANSDUCER TENSIOMETER,
Niedersachsisches Landesamt fuer Bodenforschung, Hannover (West Germany).
For primary bibliographic entry see Field 2G.
W74-11274

GALERKIN APPROXIMATION OF THE TIME DERIVATIVE IN THE FINITE ELEMENT ANALYSIS OF GROUNDWATER FLOW,
Princeton Univ., N.J. Dept. of Civil and Geological Engineering.
W. G. Gray, and G. F. Pinder.
Water Resources Research, Vol 10, No 4, p 821-828, August 1974. 6 fig, 2 tab, 12 ref.

Descriptors: *Finite element analysis, *Groundwater movement, Mathematical models, Simulation analysis, Numerical analysis, Time series analysis.
Identifiers: *Galerkin method.

The Galerkin method of approximation permits a high-order approximation in time as well as in space in finite element analysis of groundwater movement. The resulting approximate equations may successfully be solved by using a prismatic element with triangular cross section. The time axis runs the length of the prism and is subdivided into elements that may be linear, quadratic, or cubic. Because this formulation requires in general the solution for several time levels simultaneously, there is a resulting increase in computer time required to solve the larger matrix. Numerical experiments indicate that the selection of an optimum numerical scheme is dependent not only on the particular problem considered but also on the sequence of time steps used. (Knapp-USGS)
W74-11423

NONLINEAR TECHNOLOGICAL FUNCTIONS FOR AQUIFERS WHOSE TRANSMISSIVITIES VARY WITH DRAWDOWN,
Geological Survey, Reston, Va.
T. Maddock, III.
Water Resources Research, Vol 10, No 4, p 877-881, August 1974. 1 fig, 7 ref.

Descriptors: *Drawdown, *Transmissivity, *Aquifers, *Water level fluctuations, *Unsteady flow, Aquifer testing, Water table, Mathematical studies, Equations.
Identifiers: *Algebraic Technological Function, *Boussinesq equation.

An algebraic technological function (ATF) exists for an aquifer whose flow to wells can be remodeled by Boussinesq's equation. Drawdown is an infinite power series in pumping values, and the ATF is provided by a finite sum of the power series. The number of terms necessary for the finite sum to provide a good approximation to the infinite series depends on a ratio of drawdown to saturated thickness. The ATF can be used in optimization techniques or as a method for predicting drawdowns from pumping. (Knapp-USGS)
W74-11424

GROUNDWATER DISCHARGE FROM THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1973,
Geological Survey, Austin, Tex.
R. A. Rappmund.
Edwards Underground Water District Bulletin 32, July 1974. 9 p, 1 tab, 13 ref.

Descriptors: *Discharge(Water), *Springs, *Water wells, *Texas, Karst, Limestones, Aquifers, Water yield, Data collections, Basic data collections, Hydrologic data.
Identifiers: *Edwards aquifer(TX).

The estimated total well and spring discharge from the Edwards and associated limestones in the San Antonio area of Texas during 1973 was 838,000 acre-ft, which is the record high for the period 1934-73. The increase was due primarily to above-average springflow. The total discharge for 1973 was about 12% more than in 1972, and 53% greater than the average for 1934-72. About 37% of the total discharge came from wells, and approximately two-thirds of this discharge was from wells in Bexar County. Well discharge in 1973 was 16%

less than in 1972, while springflow increased by about 41%. (Knapp-USGS)
W74-11440

PROSPECTS OF GROUNDWATER USE IN THE NEMAN AND NERIS RIVER VALLEYS (PERSPEKTIVY ISPOL'ZOVANIYA PODZEMNYKH VOD RECHNYKH DOLIN NYAMUNAS I NERIS),
Litovskii Nauchno-Issledovatelskii Geologorazvedochnyi Institut, Vilnius (USSR).
For primary bibliographic entry see Field 4B.
W74-11447

2G. Water In Soils

INTERACTION OF TEMPERATURE AND MOISTURE ON IRON AND MANGANESE AVAILABILITY IN SOILS,
Quebec Ministere de l'Agriculture et de la Colonisation. Div. of Soils.
B. T. Cheng, G. J. Quellette, and S. J. Bourget.
Nat Can (Que). Vol 99, No 5, p 515-521. 1972.
Identifiers: *Iron *Manganese, *Soil moisture, *Soil temperature, *Canada, Soil chemistry.

The influence of moisture and temperature on Mn and Fe status in 2 Quebec (Canada) soil types was investigated under incubation room conditions. Increasing soil temperature from 272 degrees K to 305 degrees K resulted in a definite increase of exchangeable Mn and Fe in both saturated soils. The amount of exchangeable Mn in Platon soil was 2 1/2 times higher when kept at 305 degrees K and 200% field moisture capabity than when kept at 239 degrees K and dry. There was approximately 12 times more exchangeable Mn in Tilly soil samples which were subjected to the highest temperature and moisture treatments than in those subjected to low moisture and temperature. The corresponding values in the case of exchangeable Fe were 33 for Platon soil and 14 for Tilly soil. There was no significant difference in any of the data comparing 239 degrees K with 272 degrees K. Soil moisture levels of 60% field capacity or less resulted in no significant effect of soil temperature on the release of exchangeable Fe and Mn.--Copyright 1973, Biological Abstracts, Inc.
W74-10913

EFFECT OF NITROGEN AND PHOSPHORUS AT TWO MOISTURE LEVELS ON THE STATUS OF THE AVAILABLE ZN, CU, MN AND FE IN THE SOIL,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils.
For primary bibliographic entry see Field 5B.
W74-10918

SOME FEATURES OF WATER INFILTRATION INTO SOIL DURING SPRINKLER IRRIGATION (NEKOTORYYE OSOBENNOSTI VPITYVANIYA VLAGI V POCHVU PRI DOZHDEVANII),
V. M. Sorochkin.
Pochvovedeniye, No 8, p 60-67, August 1973. 1 fig, 6 tab, 9 ref.

Descriptors: *Soil physics, *Infiltration, *Infiltration rates, *Sprinkler irrigation, *Rainfall simulators, Simulated rainfall, Precipitation(Atmospheric), Rainfall intensity, Irrigation practices, Rates of application, Soil types, Soil moisture, Soil properties, Particle size, Correlation analysis, Equations, Curves.
Identifiers: *USSR, *Transvolga Region, *Moscow Oblast.

The infiltration capacity of Chestnut loam at the southern tip of the Northern Transvolga Region and of Sod-Podzolic loam in the Moscow Oblast was investigated. Dynamics of infiltration during sprinkler irrigation is adequately approximated by the Kostyakov equation. The rate of infiltration in the absence of a free surface depends on rainfall intensity. The coefficient of proportionality between these indices ranged from 27% to 54% in individual experiments, the higher values relating to the first irrigation at low rates of application. Infiltration capacity of soil during sprinkler irrigation was found to depend on makeup of the plow layer, state of the soil surface, and soil moisture content. Sprinkling reduced the infiltration capacity of soil, reducing it by 25%-30% after the first sprinkling and by about 50% after the second. (Josefson-USGS)
W74-11013

AN IMPROVED FIELD METHOD FOR DETERMINATION OF DISCONTINUOUS CAPILLARY MOISTURE (USOVERSHENSTVOVANNYY POLEVOY METOD OPREDELENIYA VLAZHNOSTI RAZRYVA KAPILLYARNOY SVYAZI),
A. P. Kovtun.
Pochvovedeniye, No 8, p 121-123, August 1973. 1 fig, 3 tab.

Descriptors: *Soil moisture, *Capillary water, *Capillary action, *Analytical techniques, *On-site tests, Instrumentation, Forest soils, Soil properties, Particle size, Soil profiles.
Identifiers: *USSR, Soil monoliths.

An improved field method of determining discontinuous capillary moisture, based on the use of a ventilation device, is proposed and described. Compared with the method of field soil monoliths, this method can be used to determine discontinuous capillary moisture with greater accuracy throughout the entire soil profile and under any weather conditions in summer without the need of observers. Particle-size composition and hydrophysical properties of moderately-eroded Dark-Gray Forest Soil on loess in the summer of 1970 are tabulated. (Josefson-USGS)
W74-11014

RELATIONSHIP BETWEEN COEFFICIENTS OF HEAT CONDUCTIVITY AND THERMAL MOISTURE CONDUCTIVITY OF SOILS (O SVYAZI MEZHDU KOEFFITSIYENTAMI TEMPERATUROPROVODNOSTI I TERMOVLAGOPROVODNOSTI V POCHVAKH),
Akademiya Nauk Azerbaidzhanskoi SSR, Baku. Institut Pochvovedeniya i Agrokhimii.
A. P. Gerayzade.
Pochvovedeniye, No 8, p 124-127, August 1973. 3 fig, 3 ref.

Descriptors: *Soil types, *Soil moisture, *Moisture content, *Thermal conductivity, Soil properties, Soil density, Bulk density, Equations.
Identifiers: USSR.

Coefficients of heat conductivity and thermal moisture conductivity of soils were determined as a function of soil moisture content and density. Empirical equations are given for these relationships. A formula is derived which expresses a linear relation between the coefficients of heat conductivity and thermal moisture conductivity for each fixed density value. Heat conductivity and thermal moisture conductivity as a function of moisture content and bulk density of Yellow Earth and Meadow Sierozem are diagrammed. (Josefson-USGS)
W74-11015

METHOD OF INVESTIGATION OF NONLINEAR FILTRATION EFFECTS (O METODIKE ISSLEDOVANIYA NELINEYNYKH FIL'TRATSIONNYKH EFFEKTOV),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 7B.
W74-11016

EFFECT OF DIFFERENT LEVELS OF N-NUTRITION OF GRASS SPECIES UPON THEIR PERSISTENCY, HAY PRODUCTION AND THE CONTENT OF N-MATTER ON TEMPORARY SWAMP SITES, (IN CZECH),
F. Krajicek.
Ved Pr Vysk Ustavu Luk Pasienkov Banskej Bystrici. 8 p 97-109. 1972, Illus. English summary.

Descriptors: *Grasses, Nitrogen, Swamps.

Fourteen grass species and a meadow mixture were studied on a temporary water logged meadow site on medium soil, at a nutrient level of 100 and 200kg pure nitrients (p.n.)/ha. The study included hay production, N-matter contents, N-matter production and botanical changes of the sward. Festuca pratensis Huds., Lolium perenne L., Poa palustris L., Agrostis stolonifera L., are more efficient at a nutrient level of N 100kg p.n./ha; Dactylis glomerata L., Phleum pratense L., Poa pratensis L., Alopecurus pratensis L., at a nutrient level of 200kg p.n. N/ha. Phleum pratense L,, Poa pratensis L., Alopecurus pratensis L. and Dactylis glomerata L. were the most persistent. At an application rate 100kg p.n. N/ha Poa palustris L., Baldingera arundinacea (L) Dumort (Phalaris) and Phleum pratense L. are best; at a 200Kg p.n. N/ha rate P. pratense L., B. arudinacea (L) Dumort and Poa pratensis L. are best.--Copyright 1974, Biological Abstracts, Inc.
W74-11108

PLANT POPULATION WITH IRRIGATED WHEAT, (IN PORTUGUESE),
Instituto de Pesquisas e Experimentacao Agropecuarias Centro-Oeste, Sete Lagoas (Brazil).
E. P. Coqueiro, and J. M. V. De Andrade.
Pesqui Agropecu Bras Ser Agron. 7 p, 177-180, 1972, English summary.

Descriptors: *Wheat, Irrigation efficiency.

Five field experiments were carried out from 1966 to 1970, in Sete Lagoas, Minas Gerais (Brazil) to determine the effect of seeding rates on grain yield of irrigated wheat. By using the averages of the five experiments in regression equations it was shown that optimal spacing was 21cm between rows and optimal population density was 256 seeds/sq m.--Copyright 1974, Biological Abstracts, Inc.
W74-11111

METHODOLOGY OF PLANT TISSUE WATER POTENTIAL DETERMINATION BY THE PSYCHROMETRIC METHOD,
Vyskymny Ustav Vodohospodarksy, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 2I.
W74-11188

MOISTURE REGIME OF MEADOW SOILS ON THE OKA RIVER FLOOD PLAIN (REZHIM VLAZHNOSTI POYMENNYKH POCHV OKSKIKH LUGOV),
Dedinovskaya Opytnaya Stantsiya po Poimennomu Lugovodstvu (USSR).
M. S. Kononov.
Pochvovedeniye, No 10, p 66-79, October 1973. 2 fig, 9 tab, 8 ref.

Descriptors: *Soil moisture, *Soil water movement, *Soil-water-plant relationships, *Grasslands, *Flood plains, Water levels, Water table, Available water, Groundwater, Capillary action, Field capacity, Recharge, Flooding, Precipitation(Atmospheric), Evapotranspiration, Wilting point, Soil properties, Particle size, Meteorology, Air temperature.
Identifiers: *USSR(Oka River).

Water regime of soils on the flood plain of the Oka River in central European Russia was investigated

in 1966-70. A stable soil moisture content, resulting from capillary recharge by groundwater, is a necessary condition for high productivity of a natural flood-plain meadow. Productivity of a meadow decreases as the water table drops. A high productivity is characteristic of meadows which are continuously recharged by groundwater to the soil surface and where the amount of available water in the upper soil layer (0-20 cm) during the growing season is above 20 mm. Meadows where capillary recharge in summer does not always reach the surface and amount of available water in the top meter layer of soil exceeds 100 mm are quite productive but experience strong yearly fluctuations in yield and require irrigation during dry periods. (Josefson-USGS)
W74-11204

FALL-WINTER DEVELOPMENT OF THE BUDS OF SOME TREES IN RELATION TO SOIL MOISTURE CONTENT, (IN BYELORUSSIAN),
Akademiya Navuk BSSR, Minsk. Inst. of Experimental Botany.
M. D. Nyestsyarovich, and A. A. Novikava.
Vyestsi Akad Navuk BSSR Syer Biyal Navuk. 1 p 5-9, 1973.

Descriptors: *Soil moisture.
Identifiers: Birch, Buds, Linden, Oak.

The length, thickness and internal structure of buds during dormancy in 30-yr pedunculate oak, cut-leaf linden, and common birch grown in Minsk, USSR, with different soil moisture content were studied in Sept.-May 1969-1971. During dormancy the length and thickness of the buds varied with soil moisture content. A slight decrease in bud length and thickness was noted following a marked decrease of air temperature (Dec., Jan.); with an increase of temperature the buds reached their original size. The buds began to increase in size in March. Growth processes did not occur during dormancy in the buds at different soil moisture levels; the number of bud elements remained constant.--Copyright 1974, Biological Abstracts, Inc.
W74-11259

A MODIFIED ION EXCHANGE TECHNIQUE FOR THE DETERMINATION OF STABILITY CONSTANTS OF METAL-SOIL ORGANIC MATTER COMPLEXES,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 5A.
W74-11262

RATES OF GROWTH AND NUTRIENT UPTAKE OF IRRIGATED CORN AS AFFECTED BY N AND P FERTILIZATION,
Inst. of Agricultural Research, Volcani Bet. Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
For primary bibliographic entry see Field 3F.
W74-11263

CROP RESIDUE, SOIL WATER, AND SOIL FERTILITY RELATED TO SPRING WHEAT PRODUCTION AND QUALITY AFTER FALLOW,
Agricultural Research Service, Sidney, Mont.
For primary bibliographic entry see Field 3F.
W74-11264

COLORIMETRIC, SEMIQUANTITATIVE TEST FOR SOIL SALINITY,
Agricultural Research Service, Riverside, Calif., Salinity Lab.
C. A. Bower.
Soil Science Society of America Proceedings, Vol 36, No 3, p 527-528, May-June, 1972. 2 tab.

Descriptors: *Salinity, *Measurement, Saline soils, Soil tests, Soil analysis, Soil chemistry, Chlorides, Chromates, Sulfates.
Identifiers: Field test.

A colorimetric, semiquantitative test for soil salinity is described based on the equivalent release of yellow CrO4 ion upon reaction of Cl and SO4 with slightly soluble Ag2CrO4 and SrCrO4, respectively, to form less soluble AgCl and SrSO4. (Skogerboe-Colorado State)
W74-11265

CALCIUM, MAGNESIUM, AND POTASSIUM SATURATION RATIOS IN TWO SOILS AND THEIR EFFECTS UPON YIELDS AND NUTRIENT CONTENTS OF GERMAN MILLET AND ALFALFA,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 3F.
W74-11269

APPLIED AND RESIDUAL NITRATE-NITROGEN EFFECTS ON IRRIGATED GRAIN SORGHUM YIELD,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
For primary bibliographic entry see Field 3F.
W74-11270

A LONG-TIME WATER-TABLE STUDY OF AN IRRIGATION PROJECT IN SOUTHERN ALBERTA,
Department of Agriculture, Lethbridge, (Alberta). Research Station.
For primary bibliographic entry see Field 3F.
W74-11271

NITROGEN MINERALIZATION POTENTIALS OF SOILS,
Agricultural Research Service, Beltsville, Md. Soils Lab.
G. Stanford, and S. J. Smith.
Soil Science Society of America Proceedings, Vol 36, No 3, p 465-472, May-June, 1972. 2 fig, 5 tab, 16 ref.

Descriptors: *Nutrient removal, *Nitrogen, Leaching, Nitrogen fixation, Incubation, *Mineralogy, Aerobic conditions, Water pollution sources.

Net mineralization of N in 39 widely differing soils was determined during a 30-week period at 35C, using incubation intervals of 2, 2, 4, 4, 4, 6, and 8 weeks. Mineral N was leached from the soils before the first incubation and following each of seven incubations by means of 0.01M CaC12 and a minus-N nutrient solution. Soilwater contents were adjusted by applying suction, and losses of water during incubation under aerobic conditions were negligible. With most soils, cumulative net N mineralized was linearly related to the square root of time. The pH of soils changed very little in the course of 30 weeks' incubation. Because of the generally consistent results, the data were employed in calculating the N mineralization potential, No, of each soil, based on the hypothesis that rate of N mineralization was proportional to the quantity of N comprising the mineralizable substrate. Values of No varied from about 20 to more than 300 ppm of air-dry soil. The fraction of total N comprising No varied widely among soils. Mineralization rate constants did not differ significantly among most of the soils. (Skogerboe-Colorado State)
W74-11272

DETERMINATION OF TOTAL PHOSPHOROUS IN SOILS: A RAPID PERCHLORIC ACID DIGESTION PROCEDURE,
Purdue Univ., Lafayette, Ind. Agricultural Experiment Station.
L. E. Sommers, and D. W. Nelson.
Soil Science Society of America Proceedings, Vol 36, No 6, p 902-904, November-December, 1972. 4 tab, 17 ref.

Descriptors: *Fertility, *Phosphorous, Phosphates, Nutrients, Soil chemical properties, Soil properties, Topsoil, *Pollutant identification, Water pollution sources.

Extraction and colorimetric methods were evaluated for determining total P in soils. A procedure involving simultaneous digestion of 60 soil samples with perchloric acid and determination of extracted orthophosphate with an ascorbic acid method was evaluated. Analysis of diverse soils indicated that the proposed and conventional HClO4 digestion procedures yielded essentially the same total P values; however, both HClO4 methods underestimated total P by 1-6% when compared to Na2CO3 fusion. A comparison of colorimetric orthophosphate procedures indicated the method of Murphy and Riley (1962) was suitable for determination of orthophosphate following either HClO4 digestion or Na2CO3 fusion. Determination of total P in soils by tube HClO4 digestion and estima tion of extracted P by the method of Murphy and Riley (1962) enables rapid and precise estimation of total P in a wide range of soils. (Skogerboe-Colorado State)
W74-11273

SOIL-SUCTION MEASUREMENTS FOR EVALUATION OF VERTICAL WATER FLOW AT GREATER DEPTHS WITH A PRESSURE TRANSDUCER TENSIOMETER,
Niedersachsisches Landesamt fuer Bodenforschung, Hannover (West Germany).
O. Strebel, M. Renger, and W. Giesel.
Journal of Hydrology, Vol 18, No 3/4, p 367-370, March, 1973. 2 fig, 6 ref.

Descriptors: *Soil water, *Soil moisture, *Tensiometers, Moisture tension, Soilwater movement, Available water, Measurement.
Identifiers: *Soil suction measurements.

Periodic suction measurements at greater depths can be carried out in cased boreholes using a temporarily installed pressure transducer tensiometer. The time needed to reach constant suction values depends upon the tensiometer prestressing and the soil suction, and amounts to about 15 min to 2.5 hr according to general experience. With this technique, requiring relatively low expense for instruments, the hydraulic gradient and-combined with corresponding hydraulic conductivity values-the vertical water flow can be determined at depths up to about 10 m. (Skogerboe-Colorado State)
W74-11274

MULCH AND TILLAGE RELATIONSHIPS IN CORN CULTURE,
Ohio Agricultural Research and Development Center, Wooster.
For primary bibliographic entry see Field 3F.
W74-11275

RESIDUAL EFFECTS OF N15-LABELED FERTILIZERS IN A FIELD STUDY,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-11276

GROWTH, MINERAL COMPOSITION, AND SEED OIL OF SESAME (SESAMUM INDICUM L.) AS AFFECTED BY BORON AND EXCHANGEABLE SODIUM,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 3C.
W74-11278

PRIMING EFFECT OF N-15 LABELED FERTILIZERS ON SOIL NITROGEN IN FIELD EXPERIMENTS,
Arizona Univ., Tucson. Dept. of Soils.
For primary bibliographic entry see Field 5B.
W74-11279

CLASSIFICATION OF SANDS IN THE TEDZHEN DELTA, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
M. Khudaiyarov.
Probl Osvoeniya Pustyn'. p 2, 74-78, 1973. English summary.

Descriptors: *Sands, Classification.
Identifiers: Tedzhen(USSR).

Based on field and laboratory data, sands of the river Tedzhen delta (Turkmen SSR, USSR) are characterized. They are divided into three principal groups with nine types and 26 subtypes. Coppice-mound, slightly undulating, and small hummock sands including takyr-like depressions are suitable for irrigation. The total area of these sands in the river delta is 155,000 ha. The area under barkhan, barkhan-hymmocky and barkhan-ridgy sands are suitable for phytomelioration. Ridgy, ridgy-hummocky and net sands are used and should be used in future as grazing lands.--Copyright 1974, Biological Abstracts, Inc.
W74-11376

2H. Lakes

MOLECULAR SIZE AND SPECTRAL CHARACTERIZATION OF ORGANIC MATTER IN A MEROMICTIC LAKE,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
K. J. Hall, and G. F. Lee.
Water Research, Vol 8, No 4, p 239-251, April, 1974. 10 fig, 3 tab, 36 ref.

Descriptors: *Water pollution sources, *Solid wastes, *Lakes, *Meromixis, *Biodegradation, *Leachate, *Decomposing organic water, Leaves, Fluorescence, Degradation(Decomposition), Organic matter, Molecular structure, Spectroscopy, Litter, Forest soils, Leaching, Organic compounds.
Identifiers: *Molecular weight, Lake Mary(WI), Chromophores, Aromatic compounds.

Gel filtration was used to investigate the properties of natural organic matter in Lake Mary, Vilas County, Wisconsin. The organic matter from the meromictic lake and leaf litter consisted of a series of molecular weight fractions (from longer than 50,000 to less than 700) with different color and fluorescence properties. The soluble leaf organic matter contained a higher percentage of the high molecular weight components than did lake water, demonstrating that partial degradation was occurring as it was leached from the forest floor into the lake. The degradation resulted in destruction of some of the color-producing structures and enhancement of the fluorescence in the lake organic matter. The identification of six aromatic subunits (dibutyl phthalate, vanillin, catechol, 4-hydroxyacetophenone, 3,5-dihydroxybenzoic acid, and resorcinol) in degraded organic matter demonstrated that this material contained an aromatic skeletal structure with oxygen-containing functional groups (hydroxyl and carbonyl). Different molecular size fractions possessed similar chemical subunits although infrared spectra of undegraded material suggested some differences in the aliphatic C-H stretching and bending and the C-O stretching frequencies of the intact molecules. Some evidence is provided that ether, ester, and alkyl bonds link these aromatic subunits to form part of the structure of this complex natural organic matter. (Witt-IPC)
W74-11067

CONTRIBUTIONS TO THE COMPARATIVE STUDY OF THE SEASONAL BIORHYTHM OF GONADS AND PITUITARY NUCLEI ACIDS IN CTENOPHARYNGODON IDELIA (VAL.) REARED IN PONDS OR LIVING IN NATURAL WATERS, (IN RUMANIAN),
R. Giurca.
Bul Cercet Piscic. Vol 31, No 1/2 p 45-54, 1972. Illus. (English summary).

Descriptors: *Carp, Fish physiology.
Identifiers: Ctenopharyngodon idella, Gonads, Pituitary.

Biochemical analyses were made in grass carp (C. idella, 5,9 and 11 yr old specimens), reared in ponds. The seasonal biorhythm of gonadal and pituitary RNA and DNA was determined by spectrophotometric analyses. Spectrophotometric studies were also made on 5,6,7 and 8 yr old specimens of C. idella captured in the low Danube. The characteristics of mature grass carps caught in the low Danube and the growth rate differences between fishes living in natural waters and those reared in ponds were shown. The possibility of natural spawning in the Danube of C. idella was also discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-11128

THE PHOSPHORUS STATUS OF EUTROPHIC LAKE SEDIMENTS AS RELATED TO CHANGES IN LIMNOLOGICAL CONDITIONS--TOTAL, INORGANIC AND ORGANIC PHOSPHORUS,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5C.
W74-11131

THE INTENSITY OF THE FILAMENTOUS ALGAL PHOTOSYNTHETIC ACTIVITY IN THE FLOOD PLAIN LAKE NIZHNII USTUP AND MIDDLE DNIEPER, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W74-11157

STUDY OF THE PHYSICO-CHEMISTRY OF A RIVER SYSTEM IN THE FRENCH MORVAN: II. SEASONAL VARIATIONS AND INFLUENCE OF RESERVOIRS ON RIVERS, (IN FRENCH),
Institut National de la Recherche Agronomique, Thonon-les-Bains (France). Station d'Hydrobiologie Lacustre.
For primary bibliographic entry see Field 2K.
W74-11159

SEASONAL AND AGE-RELATED FEEDING CHANGES OF BROOK TROUT IN LITHUANIAN SPRING BROOKS, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Institut Zoologii i Parazitologii.
A. K. Kublitskak, and V. T. Sukatskas.
Liet Tsr Moksiu Akad Darb Ser B. 1. p 175-182. 1973. English summary.

Descriptors: *Trout, Streams, Aquatic insects.
Identifiers: Chironomidae, Crustacea, Ephemeroptera, Frogs, Lithuania, Salmo Trutta, Trichoptera.

Trout (Salmo trutta m. fario) (421 units) food composition changes according to the season of the year, the age of the fish and its size. In the course of the first year trout young feed mainly on aquatic insects, namely the larvae of Chironomidae, Ephemeroptera and Trichoptera. The digestive tract of fish young also contain many specimens of adult insects. In the autumn trout young began to feed on the larger forms of benthic organisms, especially worms and crustaceans. In autumn adult trout usually feed on frogs. Fish is not important as food to trout living in spring brooks since it comprises less than 4% of the ration for the trout. Maximum indices of intestinal fill-up are found in the autumn and early spring.--Copyright 1974, Biological Abstracts, Inc.
W74-11167

EVOLUTION OF THE PLANKTON BIOCENOSIS OF LAKE ANNECY, (IN FRENCH),
Institut National de la Recherche Agronomique, Thonon-les-Bains (France). Station d'Hydrobiologie Lacustre.
G. Balvay.
Ann Hydrobiol. Vol 3, No 2, p 93-116, 1972, Illus. English summary.

Descriptors: *Plankton, Lakes.
Identifiers: France, Lake Annecy.

An ecological plankton study as carried out in 1965 and 1966 in Lake Annecy ((France) Haute-Savoie) is described. The changes in the physico-chemical water characteristics and the plankton composition indicate that the lake, already changing in 1937, had become strongly eutrophic in the mid 1960's. The construction at that time of a now partly completed peripheral sewage collecting system, which releases the treated waters below the lake's outflow, has since 1968 shown an improvement in the physico-chemical conditions and the plankton biocenosis. This improvement appears correlated with the construction and gradual extension of the lakeshore sewer.--Copyright 1974, Biological Abstracts, Inc.
W74-11168

THE DENSITY AND PRODUCTION OF FISH POPULATIONS IN THE KLICAVA RESERVOIR (CZECHOSLOVAKIA) AND THEIR CHANGES DURING THE PERIOD 1957-1970,
Slovenska Akademie Ved, Bratislava (Czechoslovakia). Lab. of Fisheries and Hydrobiology.
J. Holcik, and K. Pivnicka.
Int Rev Gesamten Hydrobiol, Vol 57, No 6, p 883-894, 1972, Illus.

Descriptors: Fish populations.
Identifiers: Czechoslovakia, Klicava reservoir.

The results of 14-yr of observations are reported concerning the species composition, ichthyomass (standing crop), total and available production, harvestable yield and balance of the fish population in the Klicava reservoir (67 ha of area) in central Bohemia. Two stages of reservoir development with regard to its fish are recognized and characterized. Some phenomena concerning the course of the ichthyomass and production, and the reasons for their fluctuations are discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-11169

AQUATIC-BOG VEGETATION OF THE SAMUR RIVER BASIN, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W74-11172

GALLTRASKET: THE GEOLOGICAL DEVELOPMENT AND PALAEOLIMNOLOGY OF A SMALL POLLUTED LAKE IN SOUTHERN FINLAND,
Helsinki Univ. (Finland). Dept. of Geology and Paleontology.
P. Alhonen.
Comment Biol Soc Sci Fenn. 57. p 1-34, 1972, Illus.

Descriptors: *Lakes, *Bottom sediments, *Diatoms, Eutrophication, Chlorophyll.
Identifiers: Finland, Galltrasket.

The bottom sediments of Galltrasket provide information on 2 main aspects of its history, viz., fluctuations in its water level and a rapid eutrophi-

cation. These fluctuations are reflected in the planktonic/littoral ratio of the subfossil cladoceran fauna, and it would appear that the bathymetric and morphometric development of Galltrasket correlate with the original Blytt Sernander climatic scheme. The changes in the proportions of diatoms inhabiting certain biotopes also reflect this climatic development. During the history of Galltrasket there were 2 high water periods, corresponding to the Atlantic and Sub-Atlantic times, and 1 clear low water period correlating with the Sub-Boreal. The dynamics of lake exosystems seems to be of general significance for Quaternary research, particularly as evidence of climatic changes. Judged by its diatom stratigraphy, Galltrasket has probably been more or less eutrophic throughout its history. A relatively rapid increase in productivity can be seen in the uppermost part of the sedimentary column, being best indicated by an abrupt rise of the p curve and a clear increase in the chlorophyll content of the sediment. Since sewage was discharged to the lake, its productivity and nutrient content have reached a higher level than during any earlier period of its history.--Copyright 1974, Biological Abstracts, Inc.
W74-11173

HALIPLIDAE, DYTISCIDAE AND GYRINIDAE OF THE ISEOPROVAGLIO (LOMBARDY) PEAT BOGS (COLEOPTERA), (IN ITALIAN),
Societe Entomologica Italiana, Genoa.
C. Ravizza.
Boll Soc Entomol Ital. Vol 104, No 8, p 137-148. 1972. Illus. English summary.

Descriptors: Bogs, Lakes.
Identifiers: Bidessus grossepunctatus, Coleoptera, Dytiscidae, Gyrinidae, Gyrinus paykulli, Haliplidae, Haliplus obliquus, Hydaticus transversalis, Iseo provaglio, Italy, Porhydrus lineatus, Beetles.

The results of research on Haliplidae, Dytiscidae and Gyrinidae inhabiting the waters of the Iseo-Provaglio peat-bogs, an intermorainic lacustrine basin, near the south-eastern shore of lake d'Iseo (Lombardy, Italy) are reported. The specimens of Coleoptera Hydroadephaga were collected all over the peat-bogs and in particular were repeated many times in 3 ponds where temperature, total hardness, O2 and pH of the water were measured at the same time. Some species which are interesting from the point of view of their distribution in Lombardy (Bidessus grossepunctatus, Porhydrus lineatus) or uncommon in the biotopes of peatbogs (Haliplus obliquus, Hydaticus transversalis, Gyrinus paykulli) are considered.--Copyright 1974, Biological Abstracts, Inc.
W74-11178

EXPERIMENTS IN THE NUTRITION OF CARP GROWING IN CAGES,
S. Shiloh, and S. Viola.
Bamidgeh. Vol 25, No 1, p 17-31, 1973. Illus.

Descriptors: *Carp, *Fish physiology.

An experimental array of wire-cages, containing 1 m3 of water each, was highly efficient for conducting nutrition experiments with carp of 250-500 g of weight, at a stocking density of 200/cage. The cages were suspended in a fish pond, near the embankment. Experimental rations, in the form of 4 mm pellets, were fed twice daily, at the rate of 4% of the weight of the carp in the fastest growing group. Every treatment was repeated in 4 cages. The duration of 1 trial was 1 mo., approximately. The fish were weighed every 10 days. All rations contained 25% crude protein, not including certain nonprotein-nitrogen compounds of experimental ingredients, but differed in their contents of metabolizable energy. The weight increments of the carp showed a high correlation with the energy content of the rations (r=0.94, after omission of one divergent value). Sterilized cow manure or poultry litter were included in some of the experimental rations at levels of 10% and 20%. Since growth rates were reduced by these high-fiber ingredients, it was concluded that fast growing carp were unable to utilize fiber as a source of energy. Soybean oil added to the pellets increased growth rate in every trial.--Copyright 1974, Biological Abstracts, Inc.
W74-11190

VAUCHERIA SPECIES FROM THE DUTCH BRACKISH INLAND PONDS 'DE PUTTEN',
Vrije Universiteit, Amsterdam (Netherlands). Afdeling Plantensystematiek.
J. Simons, and M. Vroman.
Acta Bot Neerl. Vol 23, No 3, p 177-192, 1973. Illus.

Descriptors: *Ponds.
Identifiers: Chlorophyceae, Cyanophyceae, Putten, Vaucheria.

Data are given on the distribution and periodicity of Vaucheria species (V. arcassonensis, V. canalicularis, V. compacta, V. coronata, V. cruciata, V. dillwynii, V. erythrospora, V. frigida, V. intermedia, V. litorea, V. prona, V. sescuplicaria, V. sphaerospora, V. synandra, V. terrestris and V. thuretii) in 3 main types of habitat: a ditch, drainage ditches and pond banks. At 5 stations a detailed analysis of Vaucheria growth was made. On the shores of the ponds from mean water level upwards, 4 groups of species can be discerned. The occurrence of most Vaucheria species shows a seasonal periodicity. Chlorophycene and Cyanophyceae found are also listed.--Copyright 1974, Biological Abstracts, Inc.
W74-11194

HYDROLOGICAL INVESTIGATION OF SOME OXBOW LAKES OF THE LOWER KURY, (IN RUSSIAN),
A. R. Khalilov, and I. A. Akhmedov.
Izv Akad Nauk Az SSR Ser Biol Nauk. 1. p 62-65, 1973.

Descriptors: *Zooplankton, Lakes.
Identifiers: Cladocera, Copepod, Kura(USSR).

Data are presented on the seasonal change of the total population and biomass of zooplankton (rotifer, cladocerans and copepods) of 4 oxbow lakes of the Lower Kura, USSR. The data indicate that the lakes can be converted into commercial fish farms.--Copyright 1974, Biological Abstracts, Inc.
W74-11197

SOME BACTERIOLOGICAL ASPECTS OF LAKE VILA (GERONA, SPAIN),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
F. Emiliani.
Publ Inst Biol Apl Barc. 54. p 39-51. 1973. Illus. English summary.

Descriptors: *Bacteria, Lakes.
Identifiers: Spain, Thiorhodaceae, Vila Lake.

Quantitative and qualitative bacterial microflora variations in Vila Lake (Gerona, Spain), particularly Thiorhodaceae, are described. The occurrence of red waters is related to some environmental factors.--Copyright 1974, Biological Abstracts, Inc.
W74-11239

HYDROCHEMICAL TYPING OF SMALL LAKES IN ESTONIA, (IN RUSSIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
K. Simm.
Eesti Nsv Tead Akad Toim Biol. Vol 22, No 1, p 58-67. 1973, Illus.

Descriptors: *Lakes, Classification, Mineralogy.
Identifiers: Estonia.

Since the formation of the chemical composition of lake waters takes place under conditions of delayed water-exchange, factors that determine the water-salt balance play a decisive role in the hydrochemistry of lakes, especially the flow and seepage properties of lake basins. In Estonia USSR 150 lakes were grouped into five hydrochemical types. Type A: flowing lakes on moraine catchment areas with carbonate soils; type B: flowing lakes on stagnant catchment areas; type C: nonflowing lakes on sand catchment areas; type D: nonflowing lakes on limestone catchment areas with carbonate soils; and type E: nonflowing lakes on catchment areas of upper marshlands. Typing of lakes makes it possible to distinguish the hydrochemical features of lakes. These features consist of differences in the content of minerals, biogenic and organic substances, differences in the ion composition of mineral and differences in the fractional composition of organic substances. A close correlation between water organisms and hydrochemical conditions of the environment was established.--Copyright 1974, Biological Abstracts, Inc.
W74-11268

INFLUENCE OF ORGANIC POLLUTION ON LAKE MARIUT, A HIGHLY EUTROPHICATED LAKE SOUTH OF ALEXANDRIA,
Alexandria Univ. (Egypt). Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W74-11283

DISTRIBUTION OF TOTAL MERCURY IN THE FISHES OF LAKE OAHE,
Environmental Protection Agency, Kansas City, Kans. Region VII.
For primary bibliographic entry see Field 5B.
W74-11319

MERCURY POLLUTION,
For primary bibliographic entry see Field 5B.
W74-11368

FOOD BASE OF FISH AND WAYS OF INCREASING FISH PRODUCTIVITY OF THE DNEPRODZERZHINSK RESERVOIR, (IN RUSSIAN),
Dnepropetrovskii Gosudarstvennyi Universitet (USSR). Institut Gidrobiologii.
V. L. Galinskii, I. P. Lubyanov, and G. B. Mel'Nikov.
Vopr Ikhtiol. Vol 13, No 1, p 147-154. 1973.

Descriptors: Fish, *Biomass, Reservoirs, Zooplankton.
Identifiers: Aristichthys Nobilis, Dneprodzerzhinsk.

Investigations of the food base of fishes of the Dneprodzerzhinsk reservoir (USSR) showed that it is characterized by high indices of the residual numerosity and biomass of zooplankton and benthos. For a rational and effective use of the food base it is expedient to increase the numerosity of fish species already present and to introduce Aristichthys nobilis (Rich). The fish productivity of the reservoir can be doubled by taking a number of necessary reclamation measures in the shallows.--Copyright 1974, Biological Abstracts, Inc.
W74-11387

LEGAL CONTROLS OF POLLUTION IN THE GREAT LAKES BASIN,
Ontario Water Resources Commission, Toronto.
For primary bibliographic entry see Field 5G.
W74-11417

2I. Water In Plants

ENERGETICS OF A HOST-PARASITE RELATIONSHIP AS ILLUSTRATED BY THE LEECH MALMIANA NUDA, AND THE SHORTHORN SCULPIN MYOXOCEPHALUS SCORPIUS,
Guelph Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-10940

AQUATIC-BOG VEGETATION OF THE SAMUR RIVER BASIN, (IN RUSSIAN),
D. A. Aliev, V. D. Gadzhiev, and M. G. Shikhemirov.
Uch Zap Azerb Univ Ser Biol Nauk. 1. p 11-15. 1972.

Descriptors: *Bogs, *Aquatic plants.
Identifiers: Bulrush, Reed, Reedmace, Samur river, Sedge, Sphagnum.

The aquatic-bog vegetation of the Samur river basin (USSR) is represented by bulrush-reedmace agglomerations, grass-sedge meadows, sedge meadows of primitively developed sphagnum bogs, lake vegetation, and reed-reedmace formations. Boreal species (53) predominant in the flora, followed by xerophilous (14) and Caucasian (5); 1 species was cosmopolitan. The type of the others was not established. A table is presented of the species composition of the flora with an indication of the type of life form, geographic element of the flora, and range. The small size of the boggy areas (4-10 sq m - 5000 sq m) and their scattered distribution were noted.--Copyright 1974, Biological Abstracts, Inc.
W74-11172

INFLUENCE OF WATER STRESS ON PHOTOSYNTHESIS, RESPIRATION AND LEAF GROWTH OF ZEA MAYS L.,
Agricultural Univ., Wageningen (Netherlands). Lab. of Plant Physiological Research.
J. C. Wesselius, and R. Brouwer.
Meded Landbouwhogesch Wageningen. Vol 72, No 33, p 1-15, 1972. Illus.

Descriptors: *Respiration, *Photosynthesis, Leaves, Corn(Field), *Osmotic pressure.

Maize exposed to drought showed reduced leaf elongation rate and reduced photosynthesis. Respiration rate was increased when the roots were exposed to 5C during a couple of days. Sensitivity towards drought was highest for leaf elongation rate, less for photosynthesis and lowest for the rate of respiration. The reduced rates of photosynthesis which were due to water shortage could not be enhanced by increasing the partial pressure of CO2 in the ambient air from 0.03% to 0.5%. It was concluded that a reduced biochemical activity was the limiting factor under these experimental conditions. Photosynthetic rates decreased from a relative water content of 100% to 85%. Relative water content of the leaf decreased to about 75-80% on the average, whereas the rate of photosynthesis still decreased. The osmotic pressure of the leaf increased and the rate of photosynthesis decreased during water stress. A nearly linear relationship existed between osmotic pressure of the leaf and rate of photosynthesis during a period of 5 hr after root cooling.--Copyright 1974, Biological Abstracts, Inc.
W74-11182

METHODOLOGY OF PLANT TISSUE WATER POTENTIAL DETERMINATION BY THE PSYCHROMETRIC METHOD,
Vyskymny Ustav Vodohospodarksy, Bratislava (Czechoslovakia).
L. Zila.
Biol (Bratisl). Vol 28, No 1, p 77-82, 1973. Illus.

Descriptors: *Plant tissue, *Hygrometry, Soil moisture meters.
Identifiers: Chromel, Constantan thermocouple, Peltier effect.

Determination of the water potential in plant tissues by the psychrometric method is complicated and requires a thermocouple with a measuring vessel, an efficient thermostat capable of maintaining long-term thermal stability with an exactitude of the order of 0.001C, and an evaluation galvanometer. The method and equipment described uses a chromel/constantan thermocouple with a wet connection accomplished by cooling below the dew point by the Peltier effect. The method permits assessment of the relationship between the degree of soil hydration and that of plant tissues especially under conditions of different water contents in the soil.--Copyright 1974, Biological Abstracts, Inc.
W74-11188

TURGOR DIFFERENCES AND WATER STRESS IN MAIZE AND SORGHUM LEAVES DURING DROUGHT AND RECOVERY,
Consejo Superior di Investigaciones Cientificas, Madrid (Spain). Instituto de Edafologia y Biologia Vegetal.
M. Sanchez-Diaz, and P. J. Kramer.
J Exp Bot. Vol 24, No 80, p 511-515, 1973. Illus.

Descriptors: Corn(Field), *Sorghum, Drought.
Identifiers: Pressure potential, Turgor pressure.

The pressure potentials (tugor pressure) in leaves of maize (Zea mays L.) and grain sorghum (Sorghum vulgare Pers.) plants subjected to water stress in a controlled environment were estimated from measurements of water and osmotic potentials. Changes in tugor pressure were larger in sorghum than in maize during the development of water stress and after rewatering. It is suggested that this indicates a lower cell wall elasticity in sorghum than in maize. This fact may affect some of the physiological activities of sorghum.--Copyright 1974, Biological Abstracts, Inc.
W74-11191

FREE PROLINE AND WATER DEFICIT IN PLANT TISSUES, (IN RUSSIAN),
Jozsef Attila Univ., Szeged (Hungary).
G. Palfi, M. Bito, and Z. Palfi.
Fiziol Rast. Vol 20, No 2, p 233-238, 1973. Illus. English summary.

Descriptors: *Drought.
Identifiers: Proline.

The content of free proline in plants with the optimal supply of water is usually very low (0.2-0.6 mg/g dry matter). Free proline content can rapidly rise and reach 40-50 mg during slow dehydration of the tissues. Therefore, the level of free proline ('proline test') can be used as a reliable index of the degree of water deficit of the tissues. The proline test is made by chromatographic paper impregnated with a solution of isatin and retaining its reactive ability during 2-3 yr. The proline test can be also applied for the diagnosis of 'physiological drought' due to salinization or cold soils. In combination with wilting of isolated leaves, it can be used in selection to test drought-resistance. Among 80 plant species studied, the proline test was not applicable only in those plants whose tissues contained only traces of free proline: spinach, sorrel, maize and lettuce.--Copyright 1974, Biological Abstracts, Inc.
W74-11192

WATER METABOLISM OF PLANTS DURING OXYGEN DEFICIENCY, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
G. M. Grineva, and N. S. Petinov.
Izv Akad Nauk SSSR ser Biol. 1. p 13-25, 1973. Illus. English summary.

Descriptors: Corn(Field), Plant physiology, Metabolism, Oxygen requirements.

The roles of free space, membrane barriers and molecular structure of the protoplasm in the mechanism of water transport in isolated tissues and the root of a whole plant (corn) are discussed. The connection of the water regime of the plants with oxidative metabolism is analyzed. The character of water metabolism depends largely on the grade of O2 influence on various plant organs. Under conditions of local O2 deficiency of the roots the intensity of water metabolism decreases while leaf O2 deficiency increases intake, transport and output of water in contrast to normally aerated plants. The possible regulation mechanisms responsible for the appearance of 2 basic ranges of water metabolism intensity dependent on O 2 supply of various plant organs is discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-11196

THE DENSITY OF STOMATA IN LEAVES OF DIFFERENT ECOTYPES OF PHRAGMITES COMMUNIS,
Karlova Universita, Prague (Czechoslovakia). Dept. of Plant Physiology.
J. Pazourek.
Folia Geobot Phytotaxon. Vol 8, No 1, p 15-21. 1973, Illus.

Descriptors: *Stomata.
Identifiers: Phragmites Communis.

Density and total number of leaf stomata did not differ between sites having both ecotypes present and sites with only one present. Gradients of stomatal density were encountered from base to apex of shoot. Leaf blade shape was found to be influenced by habitat.--Copyright 1974, Biological Abstracts, Inc.
W74-11253

IONIC RELATIONSHIPS OF SOIL AND PLANT: 4. ION UPTAKE IN RELATION TO MEMBRANE ACTIVITY AND MOISTURE,
S. Mattson.
Acta Agric Scand. Vol 23, No 1, p 11-16. 1973.

Descriptors: *Moisture uptake, Plant physiology, Ion exchange, Cation exchange, Peas, Wheat.
Identifiers: Peas.

The uptake of phosphate, K, Ca, and Mg at various soil moisture contents has been studied. It has been found that the Ca/K and Ca/P ratios in wheat and yellow peas increase with decreasing moisture. Evidence is presented that the activity of the cation exchanging root membrane is differentiated, the youngest root end membrane being the most active. By applying the theory of membrane equilibria an explanation of the experimental results is presented.--Copyright 1974, Biological Abstracts, Inc.
W74-11280

A NEW ECOPHYSIOLOGICAL APPROACH TO FOREST-WATER RELATIONSHIPS IN ARID CLIMATES,
I. Gindel.
W. Junk B. V., The Hague, 1973, 142p.

Descriptors: *Soil-Water-Plant Relationships Transpiration, Retardants, Forestry.

Various problems analyzed during ecological and morphoanatomical investigations are discussed, including the relation between anatomorphogenesis and the environment, the correlation between physical environmental conditions and biological properties of the plant and the consumption of moisture by plants and the role of atmospheric moisture in the water balance of the plant. Other problems discussed include the definition of the transpiration process as a function of other physiological processes, the stomatal system and its ecophysiological role and radiation and its

biological function. Chapters cover the following: absorption of atmospheric moisture by woody xerophytes; concentration of rainwater by means of plastic sheets; accepted transpiration concepts; transpiration during the season of growth; the xeromorphic properties of the leaf and their relationship to the process of transpiration; and transpiration suppressants. A pertinent bibliography are included.--Copyright 1974, Biological Abstracts, Inc.
W74-11386

2J. Erosion and Sedimentation

METHYLATION OF MERCURY IN LAKE AND RIVER SEDIMENTS DURING FIELD AND LABORATORY INVESTIGATIONS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5B.
W74-10924

EFFECT OF CHANGES IN WATER BALANCE OF CULTIVATED FIELDS ON EROSION PROCESSES (VLIYANIYE IZMENENIYA VODNOGO BALANSA SEL'SKOKHOZYAYSTVENNYKH POLEY NA PROTSESSY EROZII),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
Ye. P. Chernyshev.
Pochvovedeniye, No 7, p 110-114, July 1973. 6 tab, 9 ref.

Descriptors: *Soil erosion, *Overland flow, *Slopes, *Cultivated lands, *Cultivation, Crop production, Erosion control, Grasslands, Spring.
Identifiers: *USSR.

Agricultural practices, which alter the magnitude and regime of overland flow, have a significant effect on soil erosion intensity. Soil erosion is discussed in relation to the characteristics of overland flow in spring. On the basis of investigations carried out at the Kursk Field Experiment Station in 1969-71 and of data available on the subject, soil erosion patterns were established during application of different agricultural practices on the water balance of cultivated fields with varying amounts of overland flow. Erosion control on slopes with a steepness of 3-5 deg in forested-steppe zones should be directed at reducing surface retention of overland flow in spring by increasing the infiltration capacity of soil. (Josefson-USGS)
W74-11011

QUALITY OF WATER AND SUSPENDED SEDIMENTS IN THE BAKSAN AND MALKA RIVERS (O KACHESTVE VODY I VZVESHENNYKH NANOSOV REK BAKSANA I MALKI),
For primary bibliographic entry see Field 5B.
W74-11012

THE RANDOM MODEL IN FLUVIAL GEOMORPHOLOGY,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 8B.
W74-11035

HISTORY OF METAL POLLUTION IN SOUTHERN CALIFORNIA COASTAL ZONE,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W74-11130

THE PHOSPHORUS STATUS OF EUTROPHIC LAKE SEDIMENTS AS RELATED TO CHANGES IN LIMNOLOGICAL CONDITIONS--TOTAL, INORGANIC AND ORGANIC PHOSPHORUS,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5C.
W74-11131

THE INFLUENCE OF THE EUTROPHIC PROCESS OF WATERS BY ERODED SOIL MATERIAL, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W74-11207

EROSIONAL AND DEPOSITIONAL ASPECTS OF HURRICANE CAMILLE IN VIRGINIA, 1969,
Geological Survey, Washington, D.C.
G. P. Williams, and H. P. Guy.
Available from GPO, Washington, D C 20402, Price $1.80 paper copy. Professional Paper 804, 1973. 80 p, 57 fig, 11 tab, 65 ref.

Descriptors: *Erosion, *Sedimentation, *Hurricanes, *Virginia, *Debris avalanches, Landslides, Mudflows, Sediment transport, Disasters, Erosion rates, Floods, Channel erosion, Stream erosion, Mass wasting.
Identifiers: *Hurricane Camille(1969).

Erosion and sedimentation resulting from the worst natural disaster in central Virginia's recorded history, the flood resulting from an 8-hour deluge of about 28 inches of rain on the night of August 19-20, 1969, are described. Erosion resulted mainly from debris avalanches down the mountainsides and channel scour along streams and headwater tributaries. Total amounts of sediment yield from mountainous areas in Nelson County were about 3.2-4.6 million cubic feet per square mile, probably the equivalent of several thousand years of normal denudation. Characteristics of the debris avalanches were that (1) they usually followed preexisting depressions on hillsides and occurred on slopes greater than 35 percent, (2) the upslope tip of the avalanche scar tended to be located at the steepest part of the hillside, (3) hillsides facing north, northeast and east were more susceptible to avalanching than slopes facing other directions, and (4) debris-avalanches caused rapid and devastating surges of water and sediment in the stream channels. Slightly more than half of the total sediment contributed to the stream system was from erosion of stream channels. The types of sediment deposits were (1) debris-avalanche deposits, (2) mountain-stream channel deposits, (3) alluvial fans, (4) delta-like deposits at the junction of a stream and major highway, where water backed up during the flood due to plugging of a culvert, and (5) accretion deposits on flood plains. (Knapp-USGS)
W74-11233

SEDIMENTATION: AN INTRODUCTION TO SOLIDS FLUX THEORY,
Sheffield (England). Water Pollution Control Dept.
For primary bibliographic entry see Field 5D.
W74-11261

A NEW MEIOFAUNA SAMPLER FOR QUANTITATIVE SAMPLING IN SOFT BOTTOMS, (EIN NEUER 'MEIOFAUNASTECHER' ZUR QUANTITATIVEN PROBENNAHME IN WEICHBODEN),
Kiel Univ. (West Germany). Zoologisches Institut.
For primary bibliographic entry see Field 7B.
W74-11313

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO ESTUARINE SEDIMENTS CONTAINING HIGH CONCENTRATIONS OF ZINC AND CADMIUM,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11337

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO MANGANESE IN ESTUARINE SEDIMENTS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11338

COPPER CONTENT IN THE INSHORE AND ESTUARINE WATERS ALONG THE CENTRAL WEST COAST OF INDIA,
National Inst. of Oceanography, Panjim (India).
For primary bibliographic entry see Field 5B.
W74-11358

ERODIBILITY OF SOILS UNDER STORM RUNOFF CONDITIONS (ERODIRUYEMOST' POCHV V USLOVIYAKH LIVNEVOGO STOKA),
Akademiya Nauk Moldarskoi SSR, Kishinev. Otdel Geografii.
Kh. P. Bogdanov, and V. V. Slastikhin.
Pochvovedeniye, No 9, p 129-131, September 1973. 1 fig, 1 tab, 18 ref.

Descriptors: *Soils, *Soil erosion, *Erosion rates, *Surface runoff, *Sprinkler irrigation, Sprinkling, Rainfall simulators, Particle size, Slopes, Erosion control.
Identifiers: *USSR(Moldavian SSR).

Accurate estimates of soil erodibility on slopes are of particular importance in Moldavia in connection with formulation of a general plan of erosion control for 1971-80 and implementation of sprinkler irrigation of large land areas. Sprinkling experiments were carried out on Gray Forest clay loam and coarse loam and on Ordinary, Calcareous, and Leached Chernozems. A relation was established between erodibility of soils and their particle-size composition. The index of soil erodibility was calculated as the mean ratio of surface runoff (in cu m) to weight of eroded soil (in metric tons) and can be used to forecast erosion intensity on different soils. Soil erosion in metric tons/ha as a function of surface runoff in cu m/ha is diagrammed, and soil particle-size composition and index of soil erodibility are tabulated. (Josefson-USGS)
W74-11449

SURFACE RUNOFF AND SOIL EROSION IN FOOTHILLS OF DAGESTAN (O POVERKHNOSTNOM STOKE I SMYVE POCHV V PREDGOR'YAKH DAGESTANA),
Dagestanskii Nauchno-Issledovatelskii Institut Selskogo Khozyaistva, Makhachkala (USSR).
S. U. Kerimkhanov, and D. U. Dzhabrailov.
Pochevovedeniye, No 9, p 132-136, September 1973. 1 fig, 2 tab, 5 ref.

Descriptors: *Soil erosion, *Surface runoff, *Slopes, Overland flow, Rain water, Snowmelt, Snow cover, Water equivalent, Precipitation(Atmospheric), Erosion control.
Identifiers: *USSR(Dagestan), Foothills.

Surface runoff and soil erosion were investigated on piedmont slopes of Dagestan in 1969 and 1972. A study of overland flow of snowmelt and rainwater was carried out on northern- and southern-exposed slopes with a steepness of 8-10 deg. Observations of snowmelt runoff were conducted in southeastern and central foothills at an elevation of 300-400 m above sea level. Soil permeability on northern-exposed slopes was 0.8-1.2 mm/min and on southern-exposed slopes, 0.5-0.7 mm/min. In 1969, runoff from southern-exposed slopes was 40% higher than from northern-exposed slopes. In 1972 there was practically no runoff from southern-exposed slopes, while on northern-exposed slopes, runoff was 1.8 mm. Despite individual years with considerable precipitation occurring in the form of snow, surface runoff and soil erosion are insignificant, which precludes a need for measures to protect soils from erosion

caused by melt water. Erosion on piedmont slopes is generally caused by runoff of rainwaters. The proportion of precipitation which contributes to overland flow in the central foothills is twice that in southeastern regions. Runoff in the northwestern part is 3.7 times greater than in the southeast. (Josefson-USGS)
W74-11450

2K. Chemical Processes

INTERACTION OF TEMPERATURE AND MOISTURE ON IRON AND MANGANESE AVAILABILITY IN SOILS,
Quebec Ministere de l'Agriculture et de la Colonisation. Div. of Soils.
For primary bibliographic entry see Field 2G.
W74-10913

SYMPOSIUM ON ENVIRONMENTAL QUALITY MONITORING; SYMPOSIUM ON SOURCES AND EVOLUTION OF THE ATMOSPHERIC AEROSOL; GENERAL PAPERS.
For primary bibliographic entry see Field 5A.
W74-10947

SULFATE AND NITRATE CHEMISTRY IN PHOTOCHEMICAL SMOG,
Rockwell Science Center, Thousand Oaks, Calif.
For primary bibliographic entry see Field 5A.
W74-10956

CHARACTERIZATION AND ANALYSIS OF AIRBORNE PARTICULATE MATERIAL BY INFRARED SPECTROSCOPY,
Argonne National Lab., Ill. Chemical Engineering Div.
For primary bibliographic entry see Field 5A.
W74-10957

USE OF CHEMICAL-SENSING ELECTRODES IN MONITORING,
Orion Research, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W74-10972

QUALITY OF WATER AND SUSPENDED SEDIMENTS IN THE BAKSAN AND MALKA RIVERS (O KACHESTVE VODY I VZVESHENNYKH NANOSOV REK BAKSANA I MALKI),
For primary bibliographic entry see Field 5B.
W74-11012

CTD SENSORS, SPECIFIC CONDUCTANCE AND THE DETERMINATION OF SALINITY,
North Carolina State Univ., Raleigh. Inst. of Marine Sciences.
For primary bibliographic entry see Field 7B.
W74-11033

ANALYSES OF PAPER MACHINE WATERS WITH ION-SPECIFIC ELECTRODES. PART I. EFFECT OF PH AND IONIC STRENGTH OF SOLUTION ON CALCIUM, CUPRIC, CHLORIDE, SODIUM, AND NITRATE ION SPECIFIC ELECTRODES,
Valmet Oy, Jyaskyla (Finland).
For primary bibliographic entry see Field 5A.
W74-11093

ANALYSES OF PAPER MACHINE WATERS WITH ION-SPECIFIC ELECTRODES, PART II. CALCIUM, CUPRIC, CHLORIDE, SODIUM AND NITRATE ION SPECIFIC ELECTRODE POTENTIALS AT VARIOUS TEMPERATURES AND IN COMPOSITE SOLUTIONS,
Valmet Oy, Jyaskyla (Finland).
For primary bibliographic entry see Field 5A.
W74-11094

AN EMPIRICAL INTERMOLECULAR POTENTIAL ENERGY FUNCTION FOR WATER,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
L. L. Shipman, and H. A. Scheraga.
The Journal of Physical Chemistry, Vol 78, No 9, p 909-916, April 25, 1974. 6 fig, 2 tab, 53 ref.

Descriptors: *Water structure, *Molecular structure, Thermodynamics, Water properties, Theoretical analysis, Ice, Water vapor.

An empirical intermolecular potential energy function for water has been derived, using data available from experimental and theoretical studies. These data include the lattice energy, x-ray structure, compressibility, and intermolecular vibrational frequencies of ice, the gas-phase dipole and quadrupole moments, gas-phase infrared and microwave structure of the water monomer, and the localized molecular orbital structure of the water monomer. Expressions have been derived that relate various macroscopic thermodynamic properties to the intermolecular potential energy function. The contributions of the zero-point vibrational energy of ice to several of the above properties have been examined. Potential energy versus O-O distance curves for various water dimers have been calculated and compared with large basis set ab initio quantum mechanical results. The need for an adequate treatment of the quantum mechanical nature of the intermolecular motions in the water dimer in the calculation of the second virial coefficient is discussed. (Witt-IPC)
W74-11106

THE DETERMINATION OF VANADIUM IN SEA WATER BY HOT GRAPHITE ATOMIC ABSORPTION SPECTROMETRY ON CHITOSAN AFTER SEPARATION FROM SALT,
Bologna Univ. (Italy).
For primary bibliographic entry see Field 5A.
W74-11109

FLUORIMETRIC DETERMINATION OF CARBOHYDRATES IN SEA WATER,
Kinki Univ., Osaka (Japan). Dept. of Fundamental Education.
For primary bibliographic entry see Field 5A.
W74-11110

METEORIC WATER IN MAGMAS,
Geological Survey, Denver, Colo.
I. Friedman, P. W. Lipman, J. D. Obradovich, J. D. Gleason, and R. L. Christiansen.
Science, Vol 184, No 4141, p 1069-1072, June 7, 1974. 1 fig, 2 tab, 12 ref.

Descriptors: *Magmatic water, *Meteoric water, *Precipitation(Atmospheric), *Oxygen isotopes, Lava, Water types, Groundwater, Nevada, Colorado, Isotope studies, Igneous rocks, Rhyolites, Petrology.
Identifiers: *Magmas.

Oxygen isotope analyses of sanidine phenocrysts from rhyolitic sequences in Nevada, Colorado, and the Yellowstone Plateau volcanic field show that delta (18)O in these magmas decreased as a function of time. This decrease may have been caused by isotopic exchange between the magma and groundwater low in (18)O. For the Yellowstone rhyolites, 7000cu km of magma could decrease in delta (18)O by 2/mil in 600,000 years by reacting with water equivalent to 3mm of annual precipitation, which is only 0.3% of the present precipitation in this region. The possibility of reaction between large magmatic bodies and meteoric water at liquidus temperatures has major implications in the possible differentiation history of the magma and in the generation of ore deposits. (Brown-IPC)
W74-11112

STUDY OF THE PHYSICO-CHEMISTRY OF A RIVER SYSTEM IN THE FRENCH MORVAN: II. SEASONAL VARIATIONS AND INFLUENCE OF RESERVOIRS ON RIVERS, (IN FRENCH),
Institut National de la Recherche Agronomique, Thonon-les-Bains (France). Station d'Hydrobiologie Lacustre.
J. Feuillade.
Ann Hydrodiol. Vol 3, No 2, p 117-140. 1972. Illus. English summary.

Descriptors: *Lakes, *Reservoirs, Water chemistry, Phytoplankton, Rivers.
Identifiers: Ammonia, Iron, Magnesium, Nitrogen, Phosphorus.

This work is the continuation of one carried out in 1966-67 on lakes only. The rivers have a torrential aspect in the zone studied. The Settons reservoir warms the water getting through but retains P during maximal phytoplankton growth. This lake also retains nitrate N and releases ammonia. The Chaumecon reservoir which is deep and with effluent water from the base of the dam cools water getting through it between winter and late summer. This lake is an Fe and P trap. It releases in the river by-products from organic matter in the oxidized form: nitrate N and sulfate. The Crescent reservoir is deep but only gives a poor flow of deep water in the river. It is without important thermic activity on these waters. The waters flowing from this lake are much enriched with dissolved substances, specially with reduced Fe. All correlation coefficients and canonic variables were calculated with a computer. Some correlations are pointed out by graphic methods. Flow variations are of little importance on water physico-chemistry. The Chaumecon reservoir has a good action in the water flowing through it. The Crescent reservoir has a noxious action.--Copyright 1974, Biological Abstracts, Inc.
W74-11159

DISSOLVED OXYGEN AND PRIMARY PRODUCTION IN HYPERTROPHIC SHALLOW LAKES IN THE DISTRICT OF THE RIVER HAVEL,
Wasserwirtschaftsdirektion Havel, Potsdam (East Germany).
L. Kalbe.
Int Rev Gesamten Hydrobiol. Vol 57, No 6, p 825-862, 1972, Illus. English summary.

Descriptors: *Dissolved oxygen, *Lakes, Phytoplankton, Ducks(Domestic), *Primary productivity.
Identifiers: East Germany, Havel River.

Three shallow lakes with domestic ducks in the District of the River Havel (East Germany) in the years 1966-1969 were studied. In consequence of large imports of nutritive substances from domestic ducks and waste water, large amounts of N salts and P were found at all times of the year. The diurnal curves show important differences of the amount of dissolved O2 at night compared to that during the day. The maximum daily primary production in 1 of these lakes, the Grossin-See, was 10.9 gC/cu m. The entire population is the cause of long-term tendencies for the amount of dissolved O2 to increase and decrease. This is an expression of the variable activity of the phytoplankton. Some possible methods for primary production measurements were used. Odum's method of interpretation of diurnal curves should be preferred.--Copyright 1974, Biological Abstracts, Inc.
W74-11170

A STUDY ON THE FRACTIONATION OF ORGANIC MATTER IN NATURAL WATER BY ULTRAFILTRATION TECHNIQUES,
National Swedish Environment Protection Board, Uppsala.
A. Wilander.
Schweiz Z Hydrol. Vol 34, No 2, p 190-200, 1972. Illus.

Descriptors: *Organic matter, *Distillation, *Filtration.

Ultrafiltration is one method for discrete separation of high and low molecular weight organic substances in natural water. Diaflo filters with nominal molecular weight cutoffs at 1000 and 10,000 have been used. The UM 2 filter has been specially studies with respect to retention of inorganic and organic substances. With the described procedure the retention varied from -4% for Na to 72% for Mg. The binding of Ca by organic substances in natural water is between 1 and 10%. The retention of some nutrients was also studied, varying from 27% for nitrate to 77% for phosphate. The retention of natural organic matter was 66-94% when measured as permanganate comsumption and 84-99% when measured as absorbance. With the UM 10 filter the mean retention of colored matter was 95 and with PM 10 36%.--Copyright 1974, Biological Abstracts, Inc.
W74-11187

COLORIMETRIC, SEMIQUANTITATIVE TEST FOR SOIL SALINITY,
Agricultural Research Service, Riverside, Calif., Salinity Lab.
For primary bibliographic entry see Field 2G.
W74-11265

HYDROCHEMICAL TYPING OF SMALL LAKES IN ESTONIA, (IN RUSSIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
For primary bibliographic entry see Field 2H.
W74-11268

POTENTIOMETRIC MEASUREMENT OF COPPER IN SEAWATER WITH ION 1 = 1 SELECTIVE ELECTRODES,
Texas Instruments, Inc., Dallas.
For primary bibliographic entry see Field 5A.
W74-11350

APPLICATION OF CHELATING ION EXCHANGE RESINS FOR TRACE ELEMENT ANALYSIS OF GEOLOGICAL SAMPLES USING X-RAY FLUORESCENCE,
Georgia Univ., Athens. Dept. of Geology.
For primary bibliographic entry see Field 5A.
W74-11364

DESIGN AND EVALUATION OF A VIDICON SCANNING SPECTROMETER FOR MOLECULAR ABSORPTION AND ATOMIC EMISSION SPECTROMETRY,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11394

FILTER PORE-SIZE EFFECTS ON THE ANALYSIS OF AL, FE, MN, AND TI IN WATER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W74-11421

COMPARISON OF OBSERVED AND CALCULATED CONCENTRATIONS OF DISSOLVED AL AND FE IN STREAM WATER,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 5A.
W74-11422

DETERMINATION OF TRACE METALS IN SODIUM DITHIONITE-CITRATE EXTRACTS OF SOILS AND SEDIMENTS BY ATOMIC ABSORPTION,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5A.
W74-11425

2L. Estuaries

A NATIONAL OVERVIEW OF EXISTING COASTAL WATER QUALITY MONITORING.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5A.
W74-11010

DATA BANK INVENTORY: VOL. II--CHESAPEAKE BAY, EDITION 1, 1949 THROUGH 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
C. Feister, and M. Karweit.
Available from NTIS, Springfield, Va. 22161 AD-761 184, Price $3.50 printed copy; $2.25 microfiche. Data Bank Report 2, Reference 73-5, January 1973. 45 p, 3 append. ONR Contract N00014-67-A-0163-0006.

Descriptors: *Data collections, *Hydrologic data, *Chesapeake Bay, *Information exchange, Data storage and retrieval, Oceanography, Basic data collections.

The Chesapeake Bay Institute (CBI) maintains a bank of information consisting of all oceanographic data collected by CPI on the Chesapeake Bay and its tributaries. Since 1949 CBI has gathered data both for specific projects and for general surveys. Much of it has been published as individual cruise reports, but never collated in a way to make it generally accessible for secondary use. Recently a complete reorganization of this data bank was undertaken to promote better utilization of its contents. (Knapp-USGS)
W74-11026

LONG WAVE EXCITATION IN HARBOURS--AN ANALYTICAL STUDY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11031

COMPUTATION OF FLOW THROUGH MASONBORO INLET, N.C.,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
M. Amein.
Sea Grant Publication 73-15, July 1973. 45 p, 14 fig, 3 tab, 17 ref. NOAA Grants 2-35178 and 04-3-158-40.

Descriptors: *Open channel flow, *Inlets(Waterways), *North Carolina, Estuaries, Tides, Streamflow, Channels, Lagoons, Mathematical models, Finite element analysis, Unsteady flow.
Identifiers: *Masonboro Inlet(NC).

The flow through the Masonboro Inlet, North Carolina system was computed by means of a numerical simulation model based on the equations of unsteady flow which represent the laws for the conservation of mass and momentum. The Masonboro Inlet system is a complex arrangement of channels connecting the coastal waterways to the Atlantic Ocean. An implicit method was used to find the solutions for the finite difference equations. The method requires that the basic equations be satisfied at all locations simultaneously. A comparison of the computed results with the field observations demonstrates the accuracy, reliability, and efficiency of the method. It is believed that the simulation model can handle other inlets, which are generally much simpler than the Masonboro Inlet, with little difficulty. (Knapp-USGS)
W74-11036

REPRODUCTION OF THE BLOODWORM (GLYCERA DIBRANCHIATA) IN THE SHEEPSCOT ESTUARY, MAINE,
National Marine Fisheries Service, West Boothbay Harbor, Maine. Dept. of Sea Shore Fisheries.
E. P. Creaser, Jr.
J Fish Res Board Can. Vol 30, No 2, p 161-166, 1973. Illus.
Identifiers: *Bloodworms, Crangon-septemspinosus, *Estuaries, Glycera-dibranchiata, Larus-argentatus, *Maine(Sheepscot estuary), *Reproduction, *Food chains, Egg growth.

The population of bloodworms (G. dibranchiata) at Wiscasset, Maine, is composed of five assumed year-classes. Most spawners are probably large three- and four-yr-old blood-worms. At Wiscasset eggs are released into the coelom at a size of 21 micrometer. The rate of egg growth varies with season. In June 1-10 million eggs are spawned at a diameter of 151-160 micrometer. A bottom temperature in excess of 13C seems necessary for spawning to occur. Spawning occurs in the afternoon, between 2 hr before and 1 hr after high water. Males emit streams of sperm while swimming at the surface; females swim rapidly at the surface and suddenly rupture, liberating all the eggs at once. Females are slightly more abundant than males in the flats. Spawning bloodworms are preyed upon by herring gulls (Larus argentatus) and striped bass (Monone saxatilis), whereas spent epitokes are consumed by the mud shrimp (Crangon septemspinosus), which in turn is eaten by striped bass.--Copyright 1973, Biological Abstracts, Inc.
W74-11043

MERCURY ORGANIC MATTER ASSOCIATIONS IN ESTUARINE SEDIMENTS AND INTERSTITIAL WATER,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-11122

MAJOR PORT DEVELOPMENTS AT RICHARDS BAY WITH DUE REGARD TO PRESERVING THE NATURAL ENVIRONMENT,
Council for Scientific and Industrial Research, Pretoria (South Africa).
J. A. Zwamborn, and C. H. Cawood.
The Civil Engineer in South Africa, Vol 16, No 2, p 79-85, February, 1974. 6 fig, 6 ref.

Descriptors: *Industrial production, *Sea water, *Bays, Marine animals, Tidal flow, Ports, Channels, Flood relief, Environmental effects.
Identifiers: *South Africa(Richards Bay), Environmental protection.

South Africa has experienced considerable industrial growth which resulted in the need for more and better harbor facilities. Particularly in view of the transport of bulk materials, Richards Bay was chosen as the most suitable site for the establishment of deep water port to serve the existing and future industrial areas of the Transvaal, the Northern Free State and Natal. Richards Bay consists of a large shallow bay connected to the sea by a shallow estuary channel through which tidal flow and marine organisms can move freely. Since only half the bay area was required for harbor development, the Natal Provincial Administration proposed preserving the southern half of the bay as a nature reserve. A levee was constructed to separate the harbor area from the southern half of the bay, and at the same time to provide access to the bluff area on the south side of the harbor entrance channel and reduce siltation in the harbor basins. Time limitations precluded the model testing an an estuarine flood relief channel direct to the sea. Provision was made for both tidal exchange between the nature reserve and the harbor, and for flood discharge, by the inclusion of a

large flood relief structure in the levee. An alternative, ecologically much more attractive solution of a new estuary channel excavated through the dunes directly to the sea became an economically feasible proposition. (Prague-FIRL)
W74-11125

WELL-MIXED ESTUARIES WITH NONLINEAR RESISTANCE,
Syracuse Univ., N. Y. Dept. of Civil Engineering.
W-H. Li.
Journal of Hydraulic Research, Vol 12, No 1, p 83-97, 1974. 6 fig, 1 tab, 4 ref, 2 append.

Descriptors: *Estuaries, *Tidal effects, *Roughness(Hydraulic), Tides, Water levels, *Flow resistance, Currents(Water), Mathematical models, Mixing, Mannings equation, Equations, Numerical analysis.
Identifiers: *Well-mixed estuaries.

Two equations which take into account nonlinear flow resistance are proposed for solving for various tidal and channel conditions in natural estuaries. These equations are intended for well-mixed estuaries with small fresh-water flow and negligible diurnal inequality. Two functions in the equations that depend on the estuary geometry are determined from linear ordinary differential equations. Flow resistance, expressed by Manning's formula, requires knowing the roughness coefficient. The effects of roughness and tidal action are separated from the effects of the estuary geometry so that repeated numerical computations with a computer can be avoided when investigating several tidal amplitudes or channel roughnesses. (Humphreys-ISWS)
W74-11137

ENVIRONMENTAL EFFECTS OF PETROCHEMICAL WASTE DISCHARGES ON TALLABOA AND GUAYANILLA BAYS, PUERTO RICO,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5C.
W74-11228

TYPICAL LEVEL OF LEAD IN MYTILUS GALLOPROVINCIALIS LMK FROM THE GULF OF TRIESTE,
Trieste Univ. (Italy).
For primary bibliographic entry see Field 5B.
W74-11290

A SEASONAL SURVEY OF THE FISHES IN THE MYSTIC RIVER, A POLLUTED ESTUARY IN DOWNTOWN BOSTON, MASSACHUSETTS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-11302

ECOLOGICAL IMPLICATIONS OF HEAVY METAL IN FISH FROM THE SEVERN ESTUARY,
Bath Univ. (England).
For primary bibliographic entry see Field 5C.
W74-11325

THE OCCURRENCE OF SOME TRACE METALS IN COASTAL ORGANISMS WITH PARTICULAR REFERENCE TO THE SOLENT REGION,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-11332

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO ESTUARINE SEDIMENTS CONTAINING HIGH CONCENTRATIONS OF ZINC AND CADMIUM,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11337

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO MANGANESE IN ESTUARINE SEDIMENTS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11338

STUDIES ON THE MECHANISMS OF RED TIDE OCCURRENCE IN HAKATA BAY, 3. THE CHARACTERISTICS OF EFFECTIVE BOTTOM MUD AND ITS GEOGRAPHICAL DISTRIBUTION PATTERN, (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5C.
W74-11341

COPPER CONTENT IN THE INSHORE AND ESTUARINE WATERS ALONG THE CENTRAL WEST COAST OF INDIA,
National Inst. of Oceanography, Panjim (India).
For primary bibliographic entry see Field 5B.
W74-11358

MONITORING TOXAPHENE CONTAMINATION IN A GEORGIA ESTUARY,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 5B.
W74-11443

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

MEMBRANES FOR REVERSE OSMOSIS,
United Kingdom Atomic Energy Authority, London (England). (assignee).
For primary bibliographic entry see Field 5D.
W74-10932

SYSTEMS ANALYSIS OF A MULTI-STAGE TUBULAR MODULE REVERSE OSMOSIS PLANT FOR SEA WATER DESALINATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
J. W. McCutchan, and V. Goel.
Desalination, Vol 14, No 1, p 57-76, February 1974. 10 fig, 1 tab, 29 equ, 17 ref.

Descriptors: *Desalination plants, *Dynamic programming, *Operating costs, Water costs, Water quality control, Sea water, Simulation analysis, Equations, Digital computers, *Reverse osmosis, Systems analysis, Mathematical modeling, *California.
Identifiers: *La Jolla(Cal), *Cost minimization.

A study is described to define single and multistage tubular module reverse osmosis systems for sea water application and to optimize these systems for minimum cost operation. Such a system has been analyzed based on current cellulose acetate membrane technology. Field data were recorded over a wide range of operating conditions on UCLA's tubular module operating on sea water feed at La Jolla, California. These data are used to develop mathematical equations to predict membrane performance under varying conditions. Cost equations are derived based on the actual costs incurred at La Jolla. A dynamic programming model is developed and solved on a digital computer, to arrive at optimum operating parameters for two- and three-stage designs. A variable membrane permeability model is used to simulate operating conditions along the tube length within a stage, to arrive at optimum membrane curing temperatures. Results show that the lowest cost water would be produced by the single-stage design if operating pressures as high as 1500 psi are used. However, two-stage operation has certain inherent advantages which could be weighed against the lower cost of single-stage operation. (Bell-Cornell)
W74-11039

MULTISTAGE EVAPORATOR,
Davidson (Maxwell) Evaporators Ltd., West Bromwich (England).
M. W. Davidson.
U.S. Patent No. 3,808,104, 5 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 2042, April 30, 1974.

Descriptors: *Patents, *Water vapor, *Distillation, *Desalination, *Evaporators, *Water treatment, Equipment, Condensation, Evaporation.
Identifiers: Multistage evaporators.

Each stage includes one or more evaporating passages through which the liquid to be evaporated is caused to descend. The evaporating passages are flanked by passages to which heating fluid is supplied. The heating fluid condenses, giving up heat to the liquid to be evaporated, and condenses in reservoirs which are divided by partitions to form barometric leg arrangements. The condensed heating fluid in the reservoirs maintains a pressure differential between successive stages. A collector tray beneath each stage collects residual unevaporated liquid and delivers it to the evaporating passages of the next stage. The tray also collects condensed heating fluid overflowing from barometric legs and delivers this to the heating passages of the next stage. The tray includes apertures to allow vapor to pass from the evaporating passages of one stage to the heating passages of the next stage. (Sinha-OEIS)
W74-11050

EVAPORATING METHOD AND EVAPORATING APPARATUS,
Sasakura Engineering Co. Ltd., Osaka (Japan). (assignee).
T. Sasakura, and T. Kurosaka.
U.S. Patent No 3,809,623, 4p, 9 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 273, May 7, 1974.

Descriptors: *Patents, *Desalination, *Evaporation, *Distillation, *Condensation, Brines, Seawater, Brackish water, Potable water, *Evaporators.
Identifiers: Multistage flash evaporation.

The shell of the multistage flash evaporating apparatus is divided into evaporating chambers which are maintained at lower pressure from stage to stage with many partitions. An opening is provided at the lower part of each partition which forms a brine passage between adjacent stages and a first throttle concerned with the generation of flash evaporation. Flash evaporation is repeated by circulating the brine continuously through a series of evaporating chambers ranging from a stage of relatively high temperature and high pressure to a stage of lower temperature and lower pressure. The brine in one evaporating chamber flows into a box with the pressure somewhat reduced. Vapor is generated in correspondence with degree of pressure drop thereby producing a two-phase flow of liquid and vapor. The vapor ascends as it is separated from the residual brine, and it enters into a condenser where it is collected as product distilled water. (Sinha-OEIS)
W74-11396

DESALINZATION SYSTEM,
A. Griffin.
U.S. Patent No 3,824,156, 2 p, 9 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 624, July 16, 1974.

Descriptors: *Patents, *Desalination, *Water treatment, Water quality control, *Condensation, *Distillation, Seawater, Equipment, Separation techniques.

The apparatus consists of a station to which salt seawater is piped, the station having electric generators driven by a turbine powered by the incoming saltwater. The station includes boiler tanks in which the saltwater is boiled so that the stream can be piped to a condenser. From there distilled, pure freshwater is piped to a freshwater storage reservoir. The electric generator supplies energy to electric heaters for boiling the saltwater, driving pumps and powering all the equipment at the station. (Sinha-OEIS)
W74-11400

MULTIPLE EFFECT EVAPORATING APPARATUS,
Sasakura Engineering Co. Ltd., Osaka (Japan).
M. Takada.
U.S. Patent No 3,824,155, 3 p, 7 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 624, July 16, 1974.

Descriptors: *Patents, *Evaporation, *Desalination, *Distillation, *Water treatment, Sea water, Heat transfer, Potable water, Condensation, Equipment, *Evaporators.

The operation of the multiple effect evaporating apparatus is as follows: Seawater introduced from a piping, passing through the condenser, cools and condenses the vapor produced in the last effect and then is discharged from an exhaust pipe. The exhaust pipe is provided with a branch pipe through which a portion of the sea-water to be exhausted is sent as feed water, via a piping into a brine will. The brine thus mixed with the sea-water is pumped from the brine well by a circulating pump, a portion of which is supplied to the preheaters and the remainder is exhausted out of the system via an exhaust pipe. Where necessary, injection of scale inhibitor, deaeration, etc. will be carried out as in the case of a conventional seawater evaporating method. It is also possible to make only fresh sea-water flow through the preheater as circulating brine, without mixing it with concentrated brine. Thus, distilled water repeats flash evaporation and condensation and is finally flashed into the distilled water chamber of the lowermost stage. The flashed-off vapor in this chamber is combined with the vapor generated from the brine in the last effect and then condensed by the condenser which is supplied with the afore-mentioned feed water. Resultant condensate accumulates in the distilled water chamber and then is withdrawn by a distilled water pump through a piping. (Sinha-OEIS)
W74-11401

EVAPORATING METHOD AND APPARATUS,
Sasakura Engineering Co. Ltd., Osaka (Japan).
M. Takada, and K. Hamahata.
U.S. Patent No 3,824,154, 4 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 624, July 16, 1974.

Descriptors: *Patents, *Desalination, *Distillation, *Evaporation, *Water treatment, Equipment, Sea water, Potable water, Heat transfer, Condensation, Evaporators.

A process for evaporating and distilling liquids such as brine or sea water provides effective units operable at differing pressures vertically one on top of the other, with units of higher pressure positioned succeedingly higher. The uppermost of the effective units has a heating tube supplied by an external heating source and an upper brine well which has jet holes. The lowermost effective unit has a brine well and a condenser with a cooling tube. There are horisontal partition walls separating adjacent effective units, each of the partition walls forms a brine well and has a plurality of jet holes. Each of the effective units other than the uppermost has a horizontal heat transfer tube bundle including at least one heat transfer tube positioned below the jet holes of the next upper partition wall. Each of the effective units other than the lowermost effective unit has a vapor releasing chamber communicating with the interiors of the heat transfer tubes and with the preheating chamber of the succeeding effective unit. The lower most effective unit has a vapor releasing chamber surrounding the condenser which comprises an initial preheater tube. (Sinha-OEIS)
W74-11402

DISTILLATION OF SALINE WATER BY DIRECT CONTACT HEAT EXCHANGE WITH IMMISCIBLE LIQUID,
Secretary of the Interior, Washington, D.C.
K. C. D. Kickman.
U.S. Patent No 3,821,089, 3 p, 2 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 923, No 5, p 1886, June 28, 1974.

Descriptors: *Patents, *Distillation, *Desalination, *Heat transfer, *Water treatment, Saline water, Sea water, Condensation.
Identifiers: *Heat exchange, Ambiphyllic agents, Immiscible oils.

Steam is directly condensed with a cool immiscible oil admixture with an ambiphyllic agent. To overcome the formation of scale on heat transfer surfaces during saline water distillation, it has been proposed to employ an immiscible heat transfer liquid in the system wherein steam is generated from the saline feed water by directly contacting it with a hot liquid usually referred to as a hot immiscible oil. During this heat exchange, the oil is cooled. After separation from the residual feed water, the cooled oil is brought into direct contact with the generated steam to condense the steam and simultaneously heat the oil again in preparation for the next distillation cycle. (Sinha-OEIS)
W74-11414

3B. Water Yield Improvement

WARM FOG AREA SEEDING STUDIES,
Meteorology Research, Inc., Altadena, Calif.
T. B. Smith, and D. M. Takeuchi.
Available from NTIS, Springfield, Va. 22161 as AD-767 297, Price $2.75 printed copy; $2.25 microfiche. Air Force Cambridge Research Laboratories, Bedford, Massachusetts, Technical Report 73-0437, July 20, 1973. 18 p, 8 fig, 1 tab, 1 append. Contract No F 19628-72-C-0236.

Descriptors: *Fog, *Cloud seeding, *Weather modification, Model studies, Aircraft.
Identifiers: *Warm fog, *Fog dispersal.

The effects of area seeding for warm fog dispersal were tested with sized urea particles. The area seeding concept was modeled and planned on the basis of a uniform, known wind environment. Difficulties were encountered during the tests due to shifting wind patterns and wind velocities which were higher than indicated in the observational data. The area concept is difficult to carry out operationally and may be limited to uniform, predictable fog environments. (Knapp-USGS)
W74-11032

WARM FOG DISPERSAL TECHNIQUES,
Navy Weather Research Facility, Norfolk, Va.
D. M. Feit, E. E. Hindman, II, D. B. Johnson, and P. M. Tag.
Available from NTIS, Springfield, Va 22161 as AD-760 674, Price $3.50 printed copy; $2.25 microfiche. Technical Paper No 1-69 (Rev), October 1970. 46 p, 6 fig, 3 tab, 36 ref.

Descriptors: *Weather modification, *Fog, Cloud physics, Particle size, Clouds, Cloud seeding.
Identifiers: *Fog clearing.

The results of warm-fog dispersal studies at Navy Weather Research Facility, and elsewhere are summarized. Four different clearing techniques are examined: heating, helicopter or aircraft mixing, hydroscopic treatments, and water-droplet sweepout. The application of heat or mixing by aircraft can result in the total conversion of fog to water vapor. Hydroscopic treatments and water-droplet sweepout on the other hand, achieve visibility improvement by modifying the droplet spectra and by the precipitation of a sizeable portion of the liquid water from the treated zone. A warm fog is normally defined as any fog having a temperature above O deg C. In actual practice, however, fogs having temperatures down to about -5 deg C may be treated using 'warm-fog' techniques since 'supercooled' techniques are not practical until the temperature drops appreciably below O deg C. (Knapp-USGS)
W74-11200

A SUMMARY OF THE U.S. NAVY PROGRAM AND FY 1970 PROGRESS IN WEATHER MODIFICATION AND CONTROL.
Navy Weather Research Facility, Norfolk, Va.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-769 544, Price $5.25 printed copy; $2.25 microfiche. Technical Paper No 24-70, December 1970. 55 p, 20 fig.

Descriptors: *Weather modification, *Cloud physics, Cloud seeding, Climatology, Meteorology, Fog, Military aspects, Research and development.
Identifiers: *US Navy.

Weather modification research of the U.S. Navy is reviewed. The Office of Naval Research supports fundamental research in cloud physics at various universities, in a program intended to eliminate specific gaps in knowledge. The Naval Research Laboratory is responsible for conducting basic cloud physics research for the design and development of improved cloud-physics instrumentation, and for carrying out a measurement program that will provide information about the natural and artificially produced variability of microphysical processes. The Naval Weapons Center develops, tests and perfects the actual techniques and agents employed in field experiments, and carries out a broad spectrum of supporting laboratory work in physical chemistry. The Navy Weather Research Facility has responsibilities in the design, coordination and evaluation of Navy weather modification experiments, and meteorology. The Naval Air Systems Command has cognizance for Navy meteorological development, including weather modification. The Naval Weather Service Command is the operational arm of the Navy's meteorological organization. (Knapp-USGS)
W74-11203

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
A. B. Super, C. A. Grainger, J. T. McPartland, V. L. Mitchell, and R. H. Yaw.
Available from NTIS, Springfield, Va 22161 as PB-218 705, Price $6.00 printed copy; $2.25 microfiche. Final Contract Report (Part I), December 15, 1972. 425 p, 126 fig, 23 tab, 91 ref, 8 append. USBR Contract 14-06-D-6798.

Descriptors: *Cloud seeding, *Weather modification, *Montana, Meteorology, Instrumentation, Research and development, Silver iodide, Orog-

raphy, Mountains, Snowfall, Precipitation(Atmospheric).

Winter cloud seeding experiments were conducted in the Bridger Range of southwestern Montana during 1969-72 to determine the meteorological conditions under which ground-based silver iodide seeding could modify mountain snowfall in the climate of the Northern Rockies. The main portion of the research program was a randomized winter orographic cloud seeding experiment. Significant snowfall increases were obtained in at least 83 days of the 259 experimental days logged. Experiments aimed at developing a practical scheme for direct detection of cloud seeding effects are described. Several snowfall characteristics including ice crystal types, concentrations, and sizes were examined before, during, and after seeding events. Radar was used in several special experiments to directly detect seeding effects, detailed analysis of the spatial and temporal variability or orographic storms, and measurements of precipitation tops. Airflow and diffusion studies were made to verify targeting of the seeding agent. Both pilot ballon measurements and airborne plume tracing indicated generally successful targeting. (Knapp-USGS)
W74-11229

EVAPORATION OF WATER FROM SAND, 3: THE LOSS OF WATER INTO THE ATMOSPHERE FROM A SANDY RIVER BED UNDER ARID CLIMATIC CONDITIONS,
National Inst. for Water Research, Windhoek (South West Africa).
For primary bibliographic entry see Field 2D.
W74-11266

EVAPORATION OF WATER FROM SAND, 4: THE INFLUENCE OF THE DEPTH OF THE WATER-TABLE AND THE PARTICLE SIZE DISTRIBUTION OF THE SAND,
National Inst. of Water Research, Windhoek (South West Africa).
For primary bibliographic entry see Field 2D.
W74-11267

SEVENTH ANNUAL SURVEY REPORT ON THE AIR WEATHER SERVICE WEATHER MODIFICATION PROGRAM (FY 1974),
Air Weather Service, Washington, D.C.
H. A. Chary, R. L. Lininger, and J. E. Neyman.
Available from NTIS, Springfield, Va., 22161 as AWS-TR-74-254, Price $3.00 printed copy; $2.25 microfiche. Air Weather Service Technical Report 74-254, July 1974. 13 p, 3 fig, 1 tab.

Descriptors: *Weather modification, *Fog, *Military aspects, Cloud seeding.
Identifiers: *Fog dissipation.

This report is the seventh in a series of annual surveys of the Air Weather Service weather modification program. It briefly describes weather modification efforts undertaken during FY 1974, including the techniques, equipment, and results. During FY 74 AWS did not carry out any new field projects of operational testing and evaluation. The three cold-fog dissipation installations operated by AWS personnel were all used in a fully operational manner. (Knapp-USGS)
W74-11433

3C. Use Of Water Of Impaired Quality

NOTE ON LITHIUM IN SALINE GROUNDWATERS,
Central Soil Salinity Research Inst., Karnal (India).
For primary bibliographic entry see Field 5B.
W74-10908

TUCSON TACKLES TWO PROBLEMS.
For primary bibliographic entry see Field 5D.
W74-10945

MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM NO I,
Teledyne Triple R, Muskegon, Mich.
For primary bibliographic entry see Field 5D.
W74-10976

FLOAT WASH CLARIFIES WHITE WATER FOR PAPER MACHINE RE-USE,
For primary bibliographic entry see Field 5D.
W74-11091

GROWTH, MINERAL COMPOSITION, AND SEED OIL OF SESAME (SESAMUM INDICUM L.) AS AFFECTED BY BORON AND EXCHANGEABLE SODIUM,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
Y. H. Yousif, F. T. Bingham, and D. M. Yermanos.
Soil Science Society of America Proceedings, Vol 36, No 6, p 923-926, November-December, 1972. 2 fig, 3 tab, 17 ref.

Descriptors: *Salinity, *Alkali soils, *Sodium, *Boron, Chemical properties, Soil chemistry, Saline soils, Salts.
Identifiers: *Sesame.

A solution culture boron experiment was conducted with sesame to show the effects of excessive B. The boron content of leaf blades, petioles, and stems was highly correlated with substrate boron. The leaf blades contained the highest amount of boron, and the stems and least. Concentrations of 5 mg B/l or higher inhibited growth, seed production, and resulted in a leaf necrosis and premature leaf drop. Foliage of plants receiving excess B contained > 700 micrograms B/g on a dry weight basis. An exchangeable sodium experiment using clay soil with and without a synthetic soil conditioner showed that yields were sharply reduced at an ESP level of 15 or greater. Leaf blade sodium was higher for the treatments without the soil conditioner but in both series, 50% growth depression was associated with leaf values of about 0.4% Na. Potassium and Mg in the leaf blades did not vary significantly, and although calcium was decreased 50% with increasing ESP, no visual deficiency symptoms were detected. (Skogerboe-Colorado State)
W74-11278

SOME EFFECTS OF METALS DISCHARGED IN EFFLUENTS AND POSSIBILITIES FOR THEIR RECOVERY,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5D.
W74-11366

3D. Conservation In Domestic and Municipal Use

THE DETERMINATION OF ZONES OF INTENSE CONTRIBUTION TO STREAM FLOW AS RELATED TO THE CONCEPT OF PARTIAL AREA CONTRIBUTIONS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10904

ARTIFICIAL AQUIFER STOPS STORM POLLUTION.
For primary bibliographic entry see Field 5D.
W74-10929

PROBLEMS ON POLLUTION AND WATER RESOURCES IN THE NEW YORK CITY METROPOLITAN AREA,
New York City Dept. of Water Resources.
For primary bibliographic entry see Field 5D.
W74-10942

3E. Conservation In Industry

THE INTEGRATION OF SYSTEM IDENTIFICATION AND SYSTEM OPTIMIZATION,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W74-11042

FLOAT WASH CLARIFIES WHITE WATER FOR PAPER MACHINE RE-USE,
For primary bibliographic entry see Field 5D.
W74-11091

OPERATOR CERTIFICATION PROGRAMS APPLICABLE TO INDUSTRIALLY OWNED WASTE WATER FACILITIES,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-11100

SOME CURRENT PAPER INDUSTRY ENVIRONMENTAL PROTECTION PROBLEMS,
National Council of the Paper Industry for Air and Steam Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-11126

POLLUTION ABATEMENT IN A COPPER WIRE MILL.
For primary bibliographic entry see Field 5D.
W74-11383

3F. Conservation In Agriculture

EXPERIMENTAL HYDROPONIC GARDENING WITH MUNICIPAL WASTE WATER,
Florida Inst. of Tech., Melbourne. Dept. of Oceanography.
For primary bibliographic entry see Field 5D.
W74-10917

COMPARISON OF THE EFFICIENCIES OF VERTICAL AND HORIZONTAL DRAINAGE (SRAVNITEL'NAYA EFFEKTIVNOST' VERTIKAL'NOGO I GORIZONTALNOGO DRENAZHA),
N. M. Resetkina, and V. A. Dukhovnyy.
Gidrotekhnika i Melioratsiya, No 1, p 76-80, 1974. 1 fig, 1 tab.

Descriptors: *Groundwater, *Aquifers, *Hydrologic aspects, *Drainage, *Controlled drainage, Drainage practices, Subsurface drainage, Drainage engineering, Automation.
Identifiers: *USSR(Kirov area).

The efficiencies of vertical and horizontal drain and irrigation systems are compared on the basis of experiences gained with such systems in the Kirov and other areas. Vertical drain systems have advantages over horizontal systems in that they do not occupy useful farm lands, do not interfere with farming operations, they can be used year round, permit groundwater stabilization at any level, and permit the use of groundwater for irrigation. In addition, the construction of such vertical systems can be mechanized, and the operation be automated or remote-controlled. (Takacs-FIRL)
W74-10939

EFFECT OF CHANGES IN WATER BALANCE OF CULTIVATED FIELDS ON EROSION PROCESSES (VLIYANIYE IZMENENIYA VODNOGO BALANSA SEL'SKOKHOZYAYSTVENNYKH POLEY NA PROTSESSY EROZII),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2J.
W74-11011

SOME FEATURES OF WATER INFILTRATION INTO SOIL DURING SPRINKLER IRRIGATION (NEKOTORYYE OSOBENNOSTI VPITYVANIYA VLAGI V POCHVU PRI DOZHDEVANII),
For primary bibliographic entry see Field 2G.
W74-11013

ZINC TOXICITY IN HYDROPONIC CULTURE,
Guelph Univ. (Ontario). Dept. of Genetic Botany.
For primary bibliographic entry see Field 5C.
W74-11045

THE EFFECTS OF NITROGEN, POTASSIUM, AND SUBIRRIGATION ON THE YIELD, QUALITY, AND COMPOSITION OF SINGLE-TRUSS TOMATOES,
Agricultural Research Council, Littlehampton (England). Glasshouse Crops Research Inst.
P. Adams, G. W. Winsor, and J. D. Donald.
J Hortic Sci. Vol 48, No 1, p 123-133, 1973. Illus.
Identifiers: Acidity, Flowering fruits, Growth, *Nitrogen, *Potassium, *Tomatoes, Truss, Irrigation, *Crop yield.

Two successive crops of cv-'Minicraigella' were grown with subirrigation in a tiered-trough system, the troughs containing a 7:3:2 mixture of loam, peat and grit. Four concentrations of N in solution (100, 150, 200 and 250ppm N) were tested in factorial combination with three concentrations of K (200,300 and 400ppm K), the treatments being replicated four times. Plant height and leaf length increased markedly with N concentration, as also did the numbers of flowers and marketable fruits per plant, the mean weight per fruit and the total yield. Low N levels delayed harvesting. The proportion of unevenly ripened fruit decreased with increasing concentrations of both N and K. The percentage of hollow fruits was decreased by high K but increased with N concentration. The titratable acidity of the expressed fruit juices increased significantly with N concentration ($P < 0.001$) but was little affected by K treatment. The N concentration of the nutrient solution also largely controlled the percentage of K in the leaves and the total uptake of this nutrient. These unexpected results were attributed to stimulation of growth by N, leading to increased water requirements and hence to increased application of both N and K by the automatic subirrigation system. The highest yields and best quality fruit were obtained with 250ppm N and 400ppm K in the solution, although lower concentrations of K might be preferable after continued cropping in the same compost.--Copyright 1973, Biological Abstracts, Inc.
W74-11048

AN ALTERNATIVE EXPLANATION FOR THE APPARENTLY ACTIVE WATER EXUDATION IN EXCISED ROOTS,
Toronto Univ. (Ontario). Dept. of Botany.
M. T. Tyree.
J Exp Bot, Vol 24, No 78, p 33-37. 1973. Illus.
Identifiers: *Exudation, Maize, *Roots(Excised roots), Zea-Mays, *Corn(Field), Model studies, Osmotic pressure, Anions, Cations.

A standing-gradient osmotic-flow model has been proposed by others to explain the apparently active uptake in excised maize (Zea mays) roots. An alternative model is proposed which incorporates electrogenic coupling between the fluxes of anions and cations and electro-osmotic coupling between the fluxes of cations and water in the cell walls of roots. This model does not exclude the contribution (positive or negative) of a standing-gradient osmotic flow.--Copyright 1973, Biological Abstracts, Inc.
W74-11072

RATES OF GROWTH AND NUTRIENT UPTAKE OF IRRIGATED CORN AS AFFECTED BY N AND P FERTILIZATION,
Inst. of Agricultural Research, Volcani Bet. Dagan (Israel). Div. of Soil Chemistry and Plant Nutrition.
B. Bar-Yosef, and U. Kafkafi.
Soil Science Society of America Proceedings, Vol 36, No 6, p 931-936, November-December, 1972. 1 fig, 7 tab, 23 ref.

Descriptors: *Nutrient requirements, *Corn(Field), *Phosphorus, *Nitrogen, Fertilizers, Soil chemistry, Absorption.

Growth rates of corn and weekly uptake of major nutrients were measured in a permanent plot fertilization experiment. Bicarbonate-soluble P and NO3-N concentration in the soil were measured four times during the growing period. High levels of nitrates in the soil during the first month of growth suppressed dry matter production. An increase in soil phosphate concentration resulted in higher phosphate uptake and early appearance of male flowers. On the control plots, which had not received any phosphatic fertilizer for eight years, the plants took up more phosphate than the amount estimated by the bicarbonate method. The high levels of nitrates found in the soil 4 weeks after seeding dropped within the fifth week to a level of 20-10 ppm N. Denitrification to gaseous compounds in the presence of living plants due to 68 mm of sprinkler-applied water is proposed as an explantion of this phenomenon. (Skogerboe-Colorado State)
W74-11263

CROP RESIDUE, SOIL WATER, AND SOIL FERTILITY RELATED TO SPRING WHEAT PRODUCTION AND QUALITY AFTER FALLOW,
Agricultural Research Service, Sidney, Mont.
A. L. Black.
Soil Science Society of America Proceedings, Vol 37, No 5, p 754-758, September-October, 1973. 1 fig, 5 tab, 19 ref.

Descriptors: *Cultivation, *Fallowing, Organic matter, Mulching, *Fertilizers, Nitrogen, Phosphorous, Proteins, *Wheat, *Soilwater.

Over an eight year period, wheat straw mulch rates to 0, 1,680, 3,360, and 6,730 kg/ha were established each spring of the fallow year in alternate crop-fallow blocks in three replications on a Dooley sandy loam. Fertilizer subplot treatments applied before seeding spring wheat were as follows: Check, N/P, and N plus P. Both elements were applied at a rate of 34kg/ha; N was applied each crop year, and P was applied initially and every other crop year thereafter. After 14 and 21 months of fallow, average available soil water stored to a depth of 1.5 m increased significantly and was positively correlated with increasing residue levels. Each metric ton of surface residue increased average available soil water supplies 0.5 cm. Mean grain yields were positively correlated with stored soil water at seeding only when both N and P were applied. N-P fertilization increased mean grain yields 410, 580, 690, and 760 kg/ha per year for corresponding residue levels of 0, 1,680, 3,360, and 6,730 kg/ha respectively. (Skogerboe-Colorado State)
W74-11264

CALCIUM, MAGNESIUM, AND POTASSIUM SATURATION RATIOS IN TWO SOILS AND THEIR EFFECTS UPON YIELDS AND NUTRIENT CONTENTS OF GERMAN MILLET AND ALFALFA,
Ohio State Univ., Columbus.
E. O. McLean, and M. D. Carbonell.
Soil Science Society of America Proceedings, Vol 36, No 6, p 927-930, November-December, 1972. 3 tab, 16 ref.

Descriptors: *Salinity, Saline soils, Nutrients, *Calcium, *Magnesium, *Potassium, *Alfalfa, *Crop response.
Identifiers: *German millet.

A greenhouse study involving sequential cropping of two soils of differing cation exchange capacities with five Ca-Mg saturation ratios at two K levels was conducted. German millet followed by alfalfa was grown with Mg-Ca saturations varied from Mg 5%-Ca 75% to Mg 25%-Ca 55% at two K levels. German millet yields were not affected in the above range of Ca-Mg saturations. However, an apparent Mg response occurred when alfalfa yields were more than double by increasing initial Mg and Ca saturations from 3 and 18% to 5 and 75%, respectively. Exchangeable Mg and Ca ontents in the soils after cropping plus amounts removed by cropping were less than the initial contents in one soil and were more than the initial contents in the other. Evidently some type of fixation mechanism tied up Mg and Ca in the former whereas solubilization of residual lime released them in the latter. (Skogerboe-Colorado State)
W74-11269

APPLIED AND RESIDUAL NITRATE-NITROGEN EFFECTS ON IRRIGATED GRAIN SORGHUM YIELD,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
A. B. Orken, and H. D. Sunderman.
Soil Science Society of America Proceedings, Vol 36, No 1, p 94-97, January-February, 1972. 4 tab, 14 ref.

Descriptors: *Nutrient removal, *Nitrogen, *Crop response, Crop production, Crops, Leaching, Water pollution sources, *Sorghum.

Multirate nitrogen studies were conducted for a three year period, on an irrigated clay loam soil at two locations, to determine the influence of applied and residual soil N on the yield of grain sorghum. Soil samples were taken prior to fertilizer application in depth increments of 0-15, 15-30, 30-61, and 61-91 cm and analyzed for nitrate. Applied and residual soil NO3-N were found to influence grain yields. Regression analysis of the data showed highly significant relationships between quantities of soil nitrates measured at upper depths to those measured at lower depths, and grain yield and applied N+ residual NO3-N. Best correlations were obtained when residual NO3-N was included in the regression equation. Results indicated that soil samples taken to 15 or 30 cm would be sufficient for evaluation of residual nitrogen effects. (Skogerboe-Colorado State)
W74-11270

A LONG-TIME WATER-TABLE STUDY OF AN IRRIGATION PROJECT IN SOUTHERN ALBERTA,
Department of Agriculture, Lethbridge, (Alberta). Research Station.
E. Rapp, and van Schaik.
Canadian Agricultural Engineering, Vol 14, No 1, p 29-32, June, 1972. 3 fig, 2 tab, 5 ref.

Descriptors: *Drainage, *Groundwater, *Water table, Drainage, Drainage engineering, Irrigation, Groundwater movement, Soil water, *Canada.

Water table levels were measured for a period of 15 years in the Vauxhall District. The seasonal mean water table depth was 169 cm with a stan-

dard deviation of plus or minus 10 cm. On the average, 64% of the area had a water table higher than the accepted standard of 183 cm. Although variability in some Units was high, mean seasonal water table data indicate that no serious drainage problem exists in the Vauxhall District. There was no consistent relationship between irrigation water used or the total hydrologic input and the concurrent water table depth. This indicates that the water table in the Vauxhall District is not a direct function of either irrigation or seasonal rainfall on a long-term basis. (Skogerboe-Colorado State)
W74-11271

MULCH AND TILLAGE RELATIONSHIPS IN CORN CULTURE,
Ohio Agricultural Research and Development Center, Wooster.
D. M. Van Doren, Jr., and G. B. Triplett, Jr.
Soil Science Society of America Proceedings, Vol 37, No 5, p 766-769, September-October, 1973. 4 tab, 10 ref.

Descriptors: *Cultivation, *Mulching, *Organic matter, *Corn(Field).

Relative effects of soil mulch cover and various tillage practices on corn yield were studied as functions of previous crop and rainfall on a typic fragiudalf soil. Residues were removed from the soil prior to tillage, manipulated according to action of the tillage implements, or replaced on the soil surface after tillage. Eight tillage treatments consisted of all possible combinations of moldboard plowing, disking, and post emergence cultivation. Mulch cover produced three times as great a yield effect as any other single variable. Tillage variables increased yield in order of cultivation > plow > disk, and results are expressed in terms of mulch cover required to produce an equal yield effect. Most tillage and mulch effects were additive. The major reason for mulch and tillage effects on corn yield is assumed to be their influence on soil water content. Possible extrapolation of these results to other soils and climates is discussed. (Skogerboe-Colorado State)
W74-11275

RESIDUAL EFFECTS OF N15-LABELED FERTILIZERS IN A FIELD STUDY,
Illinois Univ., Urbana. Dept. of Agronomy.
R. L. Westerman, and L. T. Kurtz.
Soil Science Society of America Proceedings, Vol 36, No 1, p 91-94, January-February, 1972. 1 fig, 3 tab, 6 ref.

Descriptors: *Nutrient removal, *Nitrogen, *Leaching, Crop production, Crop response, Crops, Denitrification, *Radioisotopes, Sorghum, *Sudangrass, Water pollution sources.

Residual effects of two N15-labeled N fertilizers, urea and oxamide, were compared during the second cropping season after they had been applied at rates of 0, 56, 112, and 168 kg N/ha. 'Sudax SX11' sorghum-sudan grass hybrid was grown and harvested three times during this second cropping season while the residual effects were being measured. Fertilizer N removed in plant tops during this second year of cropping contained 13-18% of the residual fertilizer N in the soil at the end of the first season and was equal to 4-6% of that applied originally in the fertilizers. At the end of the second cropping season, 22 and 26% of the initial applications of N in urea and oxamide, respectively, remained in the soil. The effect of carriers on these amounts of residual fertilizer N was not significant. The removals in crops during the second season were essentially equal to the residual fertilizer N which had been in the soil at the end of the first season. (Skogerboe-Colorado State)
W74-11276

A WEIGHING SYSTEM FOR LYSIMETERS,
Department of Agriculture, Ottawa (Ontario). Engineering Research Service.
For primary bibliographic entry see Field 2D.
W74-11277

PRIMING EFFECT OF N-15 LABELED FERTILIZERS ON SOIL NITROGEN IN FIELD EXPERIMENTS,
Arizona Univ., Tucson. Dept. of Soils.
For primary bibliographic entry see Field 5B.
W74-11279

ASPECTS OF AGRICULTURAL USE OF POTATO STARCH WASTEWATER,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
F. A. M. De Haan, G. J. Hoogeveen, and F. Riem Vis.
Neth J Agric Sci. Vol 21, No 1, p 85-94. 1973. Illus.

Descriptors: *Water reuse, *Waste water disposal, Fertilizers.
Identifiers: Land disposal, Potato starches.

Agricultural industries in the NE Netherlands, with the potato starch industry as the most important one, produce a very large amount of wastewater. Research work is now performed on possible solutions to the environmental problems resulting from discharge of this water on open canals. Land-disposal offers such a possibility. The wastewater contains the natural components of potatoes. The main constituents are the major elements for plant nutrition thus rendering an opportunity to recycle these components. Evaluation of wastewater use for agricultural purposes must be based on a number of criteria of which the most important ones are: purification by the soil system, fertilization of agricultural crops, and economic effects. Experimental results and model calculations indicate that with mean yearly application rates in the range of 50-100 mm the relevant requirements are practical.--Copyright 1974, Biological Abstracts, Inc.
W74-11356

ERODIBILITY OF SOILS UNDER STORM RUNOFF CONDITIONS (ERODIRUYEMOST' POCHV V USLOVIYAKH LIVNEVOGO STOKA),
Akademiya Nauk Moldarskoi SSR, Kishinev. Otdel Geografii.
For primary bibliographic entry see Field 2J.
W74-11449

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

RATIONAL INSTITUTIONAL ARRANGEMENTS FOR WATER RESOURCES MANAGEMENT,
Iowa Univ., Iowa City.
For primary bibliographic entry see Field 6E.
W74-10901

STORM DRAINAGE SYSTEMS DESIGN MADE ADAPTABLE FOR COMPUTERS,
Austin Co., Roselle, N.J. Civil - Structural Dept.
M. Dillon.
Building System Design, Vol 70, No 7, p 27-29, October/November, 1973.

Descriptors: *Model studies, Storm runoff, *Drainage systems, *Storm drains, Rainfall intensity.
Identifiers: *Rational method of storm design.

The Rational Method of Storm Design is described and applied to a computerized design of storm drainage systems for 2 to 200 acre commercial and industrial sites. The Rational Method presents a formula for the peak discharge rate in cubic feet per second in terms of the drained area in acres, runoff coefficient, and the average rainfall intensity in inches per hour. It is necessary to know the time of concentration for proper design of a storm drainage system. The time of concentration is the sum of overland flow time, plus time of flow in pipe above the design section. Overland flow time is the longest period of time, measured from the beginning of a theoretical design storm, for runoff to travel from the most remote point of the collection area, along a path perpendicular to contour lines, down to the design section, usually an inlet. (Merritt-FIRL)
W74-10916

COMPARISON OF THE EFFICIENCIES OF VERTICAL AND HORIZONTAL DRAINAGE (SRAVNITEL'NAYA EFFEKTIVNOST' VERTIKAL'NOGO I GORIZONTALNOGO DRENAZHA),
For primary bibliographic entry see Field 3F.
W74-10939

A SCHEME FOR ASSESSING THE RELIABILITY OF INTERPOLATED RAINFALL ESTIMATES,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W74-10941

HYDRAULIC PERFORMANCE OF PENNSYLVANIA HIGHWAY DRAINAGE INLETS INSTALLED IN PAVED CHANNELS,
Lehigh Univ., Bethlehem, Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8A.
W74-11009

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA--VOL II, APPENDICES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 8B.
W74-11022

WATER LEVELS IN ARTESIAN AND NONARTESIAN AQUIFERS OF FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
H. G. Healy.
Florida Bureau of Geology, Tallahassee, Information Circular No 85, 1974. 94 p, 54 fig, 1 tab.

Descriptors: *Water levels, *Groundwater, *Florida, Aquifers, Withdrawal, Saline water intrusion, Data collections, Basic data collections, Hydrologic data, Water level fluctuations, Hydrogeology.

The trends and fluctuations of groundwater levels in wells tapping the principal aquifers in Florida during 1971-72 are summarized by hydrographs of wells in the several aquifers, maps showing changes in groundwater levels during specific periods, and a table summarizing the principal data in selected observation wells. The demand for freshwater for industrial, municipal, and agricultural uses in Florida has increased yearly. Although groundwater supplies have been adequate for the increased demand in most areas, water levels have declined appreciably in some. Because demand for groundwater continues to increase, shortages will occur and may become critical in some areas. In coastal areas, declining water levels may allow saltwater to enroach and shortages could result from deterioration in quality as well as from the reduction of quantity of water available. (Knapp-USGS)

W74-11025

THE RANDOM MODEL IN FLUVIAL GEOMORPHOLOGY,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 8B.
W74-11035

W.A.L.R.U.S. WATER AND LAND RESOURCE UTILIZATION SIMULATION PLAYER'S MANUAL (WISCONSIN VERSION),
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 6A.
W74-11041

ROUGHNESS COEFFICIENTS OF VEGETATED FLOOD PLAINS,
Ministry of Transport and Waterways, the Hague (Netherlands). Maas-River Study Div.
For primary bibliographic entry see Field 2E.
W74-11136

MOORHEAD BAYOU WATERSHED, SUNFLOWER COUNTY, MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Jackson, Miss.
For primary bibliographic entry see Field 6E.
W74-11143

TOMBIGBEE RIVER (EAST FORK), ITAWAMBA COUNTY, MISSISSIPPI. OPERATION AND MAINTENANCE.
Army Engineer District, Mobile, Ala.
Available from Nat. Tech. Info. Serv., as EIS-MS-73-1749-F. November 5, 1973. 73 p, 1 map.

Descriptors: *Mississippi, *Channel improvement, *Flood protection, Flood control, Gulf Coast plain.
Identifiers: *Itawamba Co, Miss, *Environmental Impact Statements.

This project is part of the continuing operation of the existing flood control program on the Tombigbee River in Itawamba County, Mississippi. The maintenance work consists of removal of snags and drift jams that obstruct the flow of the river and disposal of the debris. At present the channel is choked by drift jams and obstructions throughout its length, causing flooding which would not occur if the channel was cleared. The project will alleviate the flood conditions and improve the navigability of the river. The adverse environmental effects would be primarily the increased turbidity accompanying construction activity and the reduction of available habitat for aquatic invertebrates and algae. Bank clearing, channelization, and no action were deemed nonfeasible alternatives for this project. Both short-term and long-term productivity will be enhanced with minimal detrimental effect upon wildlife and aquatic habitat. Comments received from various state and federal agencies support this project. (Deckert-Florida)
W74-11144

WATERS AND WATERCOURSES---LIABILITY FOR DIKING FLOODWATERS: REJECTION OF THE 'COMMON ENEMY' DOCTRINE.
For primary bibliographic entry see Field 6E.
W74-11149

HYGIENIC EVALUATION OF SURFACE WATERS IN THE TRANSCARPATHIAN REGION, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W74-11171

THE HYDROLOGY OF THE LEXINGTON AND FAYETTE COUNTY, KENTUCKY AREA,
Geological Survey, Louisville, Ky.
D. S. Mull.
Lexington and Fayette County Planning Commission, Lexington, 1968. 24 p, 23 fig, 3 tab, 27 ref.

Descriptors: Water resources, *Surface waters, *Groundwater, *Kentucky, Data collections, Hydrologic data, Hydrogeology, Karst hydrology, Surface-groundwater relationships, Base flow.
Identifiers: *Lexington(KY), *Fayette County(KY).

The water resources in rivers, creeks and ponds and circulating groundwaters in Fayette County, Kentucky, are described. About 582 mgd of water, or 43.71 inches annually, enters Fayette County from precipitation. About 60 percent, or 340 mgd, of this is consumed by crops, natural vegetation, evaporation, and man. The remainder, approximately 240 mgd, is potentially available for use. Most of this water, 224 mgd, runs off in streams to the Kentucky River. A small amount of water, 16 mgd, is lost from the county by underflow. During times of flood, water levels in the streams rise above the water table and recharge the groundwater reservoir in the vicinity of the stream. Fairly high volumes of water may be discharged to the groundwater reservoir in the Lexington area due to the abundance of joints and solution openings that are common in the underlying beds of limestone. All streams in the area flow directly on bedrock or on a layer of alluvium. Streamflow is variable and results from a combination of surface runoff and seepage from groundwater in aquifers underlying the streambed. An additional source of streamflow in the urbanized area is sewage effluent. During dry weather, seepage from groundwater is the major source of streamflow in all streams in the Lexington area except Town Branch. In Town Branch the major source of dry-weather flow is effluent from the Lexington sewage treatment plant. (Knapp-USGS)
W74-11201

MOISTURE REGIME OF MEADOW SOILS ON THE OKA RIVER FLOOD PLAIN (REZHIM VLAZHNOSTI POYMENNYKH POCHV OKSKIKH LUGOV),
Dedinovskaya Opytnaya Stantsiya po Poimennomu Lugovodstvu (USSR).
For primary bibliographic entry see Field 2G.
W74-11204

WATER-SUPPLY DEVELOPMENT AND MANAGEMENT ALTERNATIVES FOR CLINTON, EATON, AND INGHAM COUNTIES, MICHIGAN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11223

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME I, REQUIREMENTS AND GENERAL PROCEDURES,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11231

GENERALIZED SKEW COEFFICIENTS OF ANNUAL FLOODS IN THE UNITED STATES AND THEIR APPLICATION,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2E.
W74-11420

FLOOD PLAIN INFORMATION, HOADLEY CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974. 23 p, 7 fig, 7 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Hoadley Creek(AK), *Ketchikan(AK).

Flooding from Hoadley Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and, for the most part, have been developed only in recent years. There are still open spaces adjacent to the stream which are available for future development. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. The study includes a history of flooding along Hoadley Creek and identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles and cross sections. A basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11427

FLOOD PLAIN INFORMATION, WHIPPLE CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974. 23 p, 7 fig, 9 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Whipple Creek(AK), *Ketchikan(AK).

Flooding from Whipple Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and have not been damaged by past floods. Although large floods have occurred in the past, studies indicate that even larger floods are possible. The open spaces along the stream which are available for future development are extensive. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to these floods through maps, photographs, profiles and cross sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11428

FLOOD PLAIN INFORMATION, CARLANNA CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974. 27 p, 8 fig, 6 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Carlanna Creek(AK), *Ketchikan(AK).

Flooding from Carlanna Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and industrial and were severely damaged by the October 1973 flood. The open spaces adjacent to the stream in the study area are limited and are not presently under pressure for development. Large floods have occurred in the past and will occur in the future. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to these floods through maps, photographs, profiles and cross sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11429

FLOOD PLAIN INFORMATION, KETCHIKAN CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.

Army Corps of Engineers Flood Plain Report, June 1974. 31 p, 13 fig, 9 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Ketchikan Creek(AK).

Flooding from Ketchikan Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and have been moderately damaged by past floods. The open spaces in the flood plain are limited and are not now under pressure for future development. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to floods through maps, photographs, profiles and cross sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11430

4B. Groundwater Management

NOTE ON LITHIUM IN SALINE GROUNDWATERS,
Central Soil Salinity Research Inst., Karnal (India).
For primary bibliographic entry see Field 5B.
W74-10908

METHOD OF TREATING SUBTERRANEAN FORMATION TO IMPROVE PERMEABILITY,
Texaco, Inc., New York.
For primary bibliographic entry see Field 8B.
W74-10931

HYDROGEOLOGY OF THE USSR. VOLUME 15: BASHKIR ASSR (GIDROGEOLOGIYA SSSR. TOM XV. BASHKIRSKAYA ASSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11017

HYDROGEOLOGY OF THE USSR. VOLUME 29: KAMCHATKA, AND THE KURIL AND KOMANDORSKIYE ISLANDS (GIDROGEOLOGIYA SSSR. TOM XXIX. KAMCHATKA, KURIL'SKIYE I KOMANDORSKIYE OSTROVA).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11018

HYDROGEOLOGY OF THE USSR. VOLUME 38: TURKMEN SSR (GIDROGEOLOGIYA SSSR. TOM XXXVIII. TURKMENSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11019

HYDROGEOLOGY OF THE USSR. VOLUME 40: KIRGIZ SSR (GIDROGEOLOGIYA SSSR. TOM XL. KIRGIZSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11020

AVAILABILITY OF GROUNDWATER IN THE LOWER PAWCATUCK RIVER BASIN, RHODE ISLAND,
Geological Survey, Washington, D.C.
J. B. Gonthier, H. E. Johnston, and G. T. Malmberg.
Available from Sup Doc, GPO, Washington, D.C. 20402 Price $3.80. Water-Supply Paper 2033, 1974. 40 p, 7 fig, 10 tab, 24 ref.

Descriptors: *Groundwater, *Groundwater availability, *Rhode Island, Groundwater recharge, Induced infiltration, Groundwater reservoirs, Water supply, Aquifers, Water quality, Withdrawal, Water yield, Surface-groundwater relationships, Water resources.
Identifiers: *Lower Pawcatuck River basin(RI).

The water availability in the lower Pawcatuck River basin in southwestern Rhode Island was determined. The basin is an area of about 169 sq mi underlain by crystalline bedrock over which lies a relatively thin mantle of glacial till and stratified drift. Water available for development in this aquifer consists of groundwater in storage plus infiltration that can be induced into streams. Minimum annual groundwater runoff is 0.76 mgd per square mile. Potential recharge by induced infiltration is estimated to range from about 250 to 600 gpd per linear foot of streambed for the principal streams. In most areas, induced infiltration from streams constitutes the major source of water potentially available for development by wells. The potential yield from five of the most promising groundwater reservoirs was evaluated by means of mathematical models. Continuous withdrawals ranging from 1.3 to 10.3 mgd, and totaling 31 mgd, are obtainable from these reservoirs. Proposed export from the Pawcatuck basin of 27 mgd will markedly reduce low streamflow. The 90% duration flow of the Pawcatuck River at Westerly would be reduced from 75 mgd to perhaps as little as 21 mgd. The chemical quality of water from both the sand and gravel aquifer and associated streams is suitable for most purposes. Some treatment may be required locally for removal of iron and manganese to meet recommended standards. (Myers-USGS)
W74-11023

GROUNDWATER BASIC DATA FOR ADAMS AND BOWMAN COUNTIES, NORTH DAKOTA,
Geological Survey, Bismarck, N. Dak.
For primary bibliographic entry see Field 2F.
W74-11024

THE INTEGRATION OF SYSTEM IDENTIFICATION AND SYSTEM OPTIMIZATION,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W74-11042

THE HYDROLOGY OF THE LEXINGTON AND FAYETTE COUNTY, KENTUCKY AREA,
Geological Survey, Louisville, Ky.
For primary bibliographic entry see Field 4A.
W74-11201

HYDROGEOLOGY OF GLACIAL DRIFT, MESABI IRON RANGE, NORTHEASTERN MINNESOTA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2F.
W74-11222

WATER-SUPPLY DEVELOPMENT AND MANAGEMENT ALTERNATIVES FOR CLINTON, EATON, AND INGHAM COUNTIES, MICHIGAN,
Geological Survey, Washington, D.C.
K. E. Vanlier, W. W. Wood, and J. O. Brunett.
Available from GPO, Washington, D C 20402, Price $3.20 paper copy. Water-Supply Paper 1969, 1973. 111 p, 35 fig, 6 tab, 34 ref.

Descriptors: *Water resources development, *Water management(Applied), *Michigan, Surface waters, Groundwater, Conjunctive use, Great Lakes, Inter-basin transfers.
Identifiers: *Lansing(Mich), Clinton County(Mich), Eaton County(Mich), Ingham County(Mich).

The water resources of the Tri-County region, consisting of Clinton, Eaton, and Ingham Counties, an area of 1,697 square miles in Michigan's Lower Peninsula were investigated. The population is nearing 400,000 and by 1990 will be near 600,000. Average daily water use is slightly more than 30 million gallons today; by 1980 it will be about 50 million gallons, and by 1990 it will probably be about 70 million gallons. The Tri-County region is drained by seven river systems. Low flows in cubic feet per second, are as follows: Grand River, 180; Maple River, 34; Looking Glass River, 28; Red Cedar River, 30; Portage Creek, 15; Battle Creek, 20; and Thornapple River,24--a total of 331 cubic feet per second or about 220 million gallons per day. The principal source of groundwater is a complex aquifer system composed of the Saginaw and Grand River Formations and some of the overlying glacial sediments. This aquifer yields between 300 and 700 gpm to individual wells. In some parts of the region, the glacial sediments are favorable for development of moderate to large supplies of water. Some of the chief factors and methods that must be considered when planning water systems are combined use of ground and surface water, artificial recharge, treatment of wastes, use of storage reservoirs, and importation of water from the Great Lakes. (Knapp-USGS)
W74-11223

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 10. PRINCIPLES OF GROUNDWATER HYDROLOGY,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11232

NONLINEAR TECHNOLOGICAL FUNCTIONS FOR AQUIFERS WHOSE TRANSMISSIVITIES VARY WITH DRAWDOWN,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2F.
W74-11424

COST ANALYSIS OF GROUNDWATER SUPPLIES IN THE NORTH ATLANTIC REGION,
Geological Survey, Reston, Va.
D. J. Cederstrom.
Water Well Journal, Vol 28, No 8, p 39-43, August 1974. 3 tab.

Descriptors: *Water wells, *Water costs, *Northeast U.S., *Water yield, Economics, Water distribution(Applied), Water sources, Water supply, Hydrogeology, Groundwater, Cost analysis, Construction costs.

Methods are given for calculating costs of groundwater supplies for municipal and industrial uses from aquifers in the North Atlantic Region. The capital cost of groundwater and the cost per thousand gallons in typical geologic and hydrologic environments is given in tabular form. For broad planning purposes, large areas may be generally characterized as to range of yields per well. The materials and work needed to construct wells with those yields can be estimated within reasonable limits. The cost of large supplies of groundwater at the wellhead in the North Atlantic Region in 1970 generally varied from 1.5 to 5 cent/kgal. Water from crystalline rocks and shale is relatively expensive. Water from sandstone is less so. Costs of water from sands and gravels in glaciated areas and from Coastal Plain sediments range from moderate to very low. In carbonate rocks costs range from low to fairly high. Development of small to moderate supplies to groundwater may

ffer favorable cost alternatives to planners, but
rge supplies of groundwater for delivery to one
oint cannot generally be developed inexpensive-
. Well fields in the less productive aquifers may
e limited by costs to 1 or 2Mgal/d, but in the more
vorable aquifers development of several tens of
illions of gallons a day may be practicable and in-
xpensive. (Knapp-USGS)
74-11426

IGITAL MODELING OF RADIOACTIVE AND
HEMICAL WASTE TRANSPORT IN THE
NAKE RIVER PLAIN AQUIFER AT THE NA-
IONAL REACTOR TESTING STATION,
DAHO,
eological Survey, Idaho Falls, Idaho.
or primary bibliographic entry see Field 5B.
74-11439

ROUNDWATER DISCHARGE FROM THE ED-
VARDS AND ASSOCIATED LIMESTONES,
AN ANTONIO AREA, TEXAS, 1973,
eological Survey, Austin, Tex.
or primary bibliographic entry see Field 2F.
74-11440

ROSPECTS OF GROUNDWATER USE IN THE
EMAN AND NERIS RIVER VALLEYS
ERSPEKTIVY ISPOL'ZOVANIYA PODZEM-
YKH VOD RECHNYKH DOLIN NYAMUNAS I
ERIS),
itovskii Nauchno-Issledovatelskii Geologoraz-
edochnyi Institut, Vilnius (USSR).
Diliunas.
itovskiy Nauchno-Issledovatel'skiy Geologoraz-
edochnyy Institut Trudy, No 22, Vilnius, Iz-
atel'stvo 'Mintis', 1973. 120 p.

escriptors: *Groundwater, *Hydrogeology,
Valleys, *Rivers, *Water utilization, Withdrawal,
Vater supply, Water yield, Aquifers, Surface-
roundwater relationships, Recharge, Water
vels, Sediments, Sedimentology, Forecasting,
oning, Cross-sections, Maps, Curves, Equations.
dentifiers: *USSR(Lithuania), *Neman
iver(USSR), *Neris River(USSR).

roblems of groundwater use in the Neman and
eris River valleys in Lithuania are discussed.
atural conditions and factors influencing ground-
ater storage, and hydrogeologic conditions in the
ver valleys are described. Procedures are given
r groundwater-yield forecasting, and prospects
artificial recharge of groundwater are studied.
osefson-USGS)
74-11447

C. Effects On Water Of Man'S Non-Water Activities

RBANIZATION AND THE ENVIRONMENT--
NGINEERING IMPLICATIONS,
hannesburg City Engineer's Dept. (South
frica).
. Bolitho.
he Civil Engineer in South Africa, Vol 16, No 2,
44-49, February, 1974. 10 ref.

escriptors: *Industries, *Cities, *Human popula-
on, *Environmental engineering, Environmental
ntrol, Pollution, *Urbanization.
dentifiers: *South Africa, Urban planning.

wo of the gravest challenges faced by the
epublic of South Africa are the need to build ci-
es and industries for approximately 20 million
eople by the end of the century and the solution
the environmental problems which this effort
ill involve. Pollution, seen as disturbing equilibri-
n, is a serious threat both within the city and to
s surroundings. The engineer will be heavily in-
volved in solutions to these problems, but to increase his effectiveness a re-examination of the engineer's role in urban planning and environmental control is necessary. (Prague-FIRL)
W74-11124

MAINTENANCE DREDGING, NEW HAVEN HARBOR, CONNECTICUT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
Available from National Technical Information Service, as EIS-CT-73-1357-F. August 16, 1973. 270 p, 27 fig, 13 tab.

Descriptors: *Dredging, *Harbors, *Connecticut, Spoil banks, Continental shelf, Atlantic Ocean, Coastal plains, Sediment control.
Identifiers: *Environmental Impact Statements, *Offshore dumping, *New Haven Harbor(CT).

This project involves maintenance dredging of the main channel in New Haven Harbor, Connecticut and disposal of 800,000 cubic yards of spoil material at the New Haven Dumping Grounds in Long Island Sound. The dredging is necessary for the continued operation of the harbor and would be done between October 1 and May 31 to minimize adverse effects upon the oyster beds present in the waters. Considerable opposition to the offshore spoil deposit has been raised by many environmental groups and government agencies. While the primary benefits of the project are economic, there is a possibility of significant detrimental effects upon aquatic life both from the dredging and the spoil deposit. The controversy centers around the uncertainty regarding the effects of the spoil on the aquatic life in the area of the dump. All alternative methods of disposal are considered prohibitively expensive. Though delay would create serious economic difficulties for the harbor area, the environmentalists urge that the project be postponed until more conclusive data can be obtained. The plan calls for continuous monitoring of the dump site for adverse effects, but this protection is considered inadequate by those who oppose the project. (Deckert-Florida)
W74-11140

4D. Watershed Protection

A FINITE ELEMENT APPROACH TO WATERSHED RUNOFF,
University Coll. of Swansea (Wales). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10937

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

THE USE OF MAGNETIC IRON OXIDE FOR RECOVERY OF VIRUS FROM WATER,
New Hampshire Univ., Durham. Water Resource Research Center.
For primary bibliographic entry see Field 5D.
W74-10905

METHODS FOR THE DIRECT DETERMINATION OF HEAVY-METAL POLLUTANTS IN THE ENVIRONMENT,
Louisiana State Univ., Baton Rouge.
D. K. Wolcott.
Available from University Microfilms, 300 No. Zeeb Rd., Ann Arbor, Mich., 48106 (Order No. 74-7273). Ph D Dissertation, 1973. 168 p.

Descriptors: *Heavy metals, Pollutants, *Ecology, *Cadmium, Liquid wastes, Oxidation-reduction, Analytical techniques, Biosphere, Plastics, Filter paper, Fluids, *Pollutant identification, *Path of pollutants.
Identifiers: Preanalysis concentration, Optical paths.

To determine the concentration of heavy metal pollutants in the ecological biosphere, large samples must be collected and/or there must be a preanalysis concentration step. A need exists for experienced personnel. A device has been designed for the direct determination of heavy metal pollutants by atomic absorption spectroscopy. This uses a carbon bed atomizer for the reduction of metal pollutants to free atoms, and a heated quartz long path absorption tube to maintain the atoms in the light path in the free atomic state. Use of the instrument includes determination of cadmium in the atmosphere, in seawater, in biological fluids, in filter papers, and in plastics. It is also calibrated for air analysis. Attempts are being made to eliminate contamination in calibrating media. (Prague-FIRL)
W74-10923

A PRELIMINARY EVALUATION OF A DISCRETE SAMPLE ANALYZER FOR CHEMICAL ANALYSIS OF WATER,
Quebec Dept. of Social Affairs.
R. St Jean, and S. S. Kasatiya.
Environmental Letters, Vol 6, No 3, p 193-203, 1974. 9 fig, 1 tab, 11 ref.

Descriptors: *Analytical techniques, *Water pollution sources, *Chemical analysis, *Instrumentation, *Pollutant identification, Water analysis, Chemical wastes, Potable water.
Identifiers: Discrete sample analyser.

The Beckman Discrete Sample Analyser (DSA-560) (KLiNa Accessory) was used to determine chlorides, fluorides, nitrates, nitrites, sodium, and potassium in drinking water samples. It was found to be precise, accurate, and rapid and was thought to be a potentially useful instrument in environmental analysis. However, it is necessary to continually supervise its use and ensure its careful handling. It is versatile, and requires small samples. (Murphy-FIRL)
W74-10936

SYMPOSIUM ON ENVIRONMENTAL QUALITY MONITORING; SYMPOSIUM ON SOURCES AND EVOLUTION OF THE ATMOSPHERIC AEROSOL; GENERAL PAPERS.
Available from ACS-Div of Environmental Chemistry, Carnegie-Mellon Univ, 4400 Fifth Ave, Pittsburgh, Penn 15213, Price $5.00 printed copy. Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, 1974, 370 p.

Descriptors: *Monitoring, *Path of pollutants, *Conferences, *Aerosols, Water treatment, Waste treatment, Water pollution, Air pollution, *Pollutant identification.

The 167th Annual Meeting of the American Chemical Society included discussions of environmental monitoring and of atmospheric aerosols. Waste treatment, water treatment, and the flow of trace elements through urban environments were also discussed. (See W74-10948 thru W74-11008) (Knapp-USGS)
W74-10947

EVOLUTION OF MONITORING FOR EARTHWATCH,
National Oceanic and Atmospheric Administration, Rockville, Md.
C. E. Jensen.

In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 1-6, 1974.

Descriptors: *Monitoring, *Pollutants, *Networks, *Environment, International commissions, Pollution abatement.
Identifiers: *Earthwatch.

Earthwatch is a global environmental assessment under the auspices of the new U.N. Environment Program. Earthwatch provides the needed framework for undertaking global environmental action, particularly in the area of monitoring. It provides for the international collaboration among nations, for the sharing of facilities and observational platforms, and for the assistance to developing countries to allow their full participation in global efforts. Earthwatch is built upon existing national and international capabilities and serves to integrate these capabilities using the Environment Fund to fill gaps where necessary and resulting in a comprehensive multidisciplinary global assessment effort. (See also W74-10947) (Knapp-USGS)
W74-10948

OPTIMIZATION OF WATER QUALITY MONITORING PROGRAMMES,
Michigan Univ., Ann Arbor. School of Public Health.
R. A. Deininger.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry Vol 14, No 1, p 7-10, 1974.

Descriptors: *Monitoring, *Water quality, Water quality control, Network design, *Optimization, Pollutant identification.

The first step in the design of a monitoring program is the establishment of a clear and unambiguous objective in quantitative terms. At the highest, or national level, information is necessary for broad planning purposes. At the second level, the regional level, all this information is necessary, plus the particular information needs for the region. The third, local level, consists usually of checking to ensure compliance with regulations and statutes. Ideally, the costs of collecting new data should be less than the benefits to be derived from these new data. (See also W74-10947) (Knapp-USGS)
W74-10949

VALIDATION OF ENVIRONMENTAL DATA BY INTERCALIBRATION AND LABORATORY QUALITY CONTROL PROGRAMS,
National Bureau of Standards, Washington D.C.
J. K. Taylor.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 11-15, 1974.

Descriptors: *Monitoring, *Laboratory tests, *Calibrations, *Analytical techniques, Chemical analysis, Data processing, Environment, Sampling, Standards, Statistics.
Identifiers: *Collaborative tests.

Accurate methodology, adequate calibrations, and systematic quality control procedures are required to provide reliable environmental quality data. A systems approach helps assure the validity of the data reported by individual stations and permits its incorporation into the body of data derived from diverse sources. The best method for development and evaluation of analytical methodology (and also for development of analytical expertise) is the time-consuming, evolutionary process of research, documentation in the literature, and critical examination by peers. A shorter and less adequate route is that of collaborative testing. A typical collaborative test consists of the circulation of identical samples to selected collaborators with the request to analyze by any familiar method. A second approach is to circulate a test material together with a specified method for measurement. (See also W74-10947) (Knapp-USGS)
W74-10950

NEED FOR COLLABORATIVE STUDIES OF STANDARD METHODS,
National Environmental Research Center, Cincinnati, Ohio. Water Supply Research Lab.
E. F. McFarren.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 16-20, 1974. 3 tab, 7 ref.

Descriptors: *Monitoring, *Laboratory tests, *Calibrations, Analytical techniques, Chemical analysis, Data processing, Environment, Sampling, Standards, Statistics.
Identifiers: *Collaborative tests.

Analytical quality control consists essentially of three programs or conditions: (1) using only methods that have been studied collaboratively and found acceptable, (2) routinely analyzing a control sample at least once on each day that unknown samples are analyzed, and (3) analyzing a few reference samples once or twice a year to confirm the ability of a laboratory to produce acceptable results. (See also W74-10947) (Knapp-USGS)
W74-10951

THE ASSESSMENT OF ENVIRONMENTAL IMPACT--WATER QUALITY AND QUALITY ASSURANCE CONSIDERATIONS,
Industrial Bio-Test Labs., Northbrook, Ill. Environmental Sciences Div.
J. J. Delfino.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 21-25, 1974.

Descriptors: *Monitoring, *Data collections, *Environment, Water quality act, Water quality, Pollution, Pollution abatement, Water pollution control, Pollutant identification.
Identifiers: *National Environmental Policy Act, *Environmental Impact Statements.

The widespread awareness and application of the philosophy and requirements of the National Environmental Policy Act of 1969 influence the way in which water quality surveys are now to be performed in support of environmental impact assessments. These surveys must be multidisciplined and consider physical and biological as well as chemical parameters. The work must be performed by well trained professionals who use modern techniques and instruments and who consistently practice good quality assurance procedures. If the quality of the large amount of water quality data now being generated matches the quantity, then meaningful impact assessments of the aquatic environment will result. Careful prior planning of long-term studies can yield valuable data which will aid in predicting potential environmental impacts and in forming the bases for designing alternative engineering solutions where needed. (See also W74-10947) (Knapp-USGS)
W74-10952

OVERVIEW OF THE CALIFORNIA AEROSOL CHARACTERIZATION EXPERIMENT,
Rockwell Science Center, Thousand Oaks, Calif.
G. M. Hidy, R. J. Charlson, S. K. Friedlander, D. Hutchison, and P. K. Mueller.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 26-28, 1974.

Descriptors: *Aerosols, *Smog, *California, Monitoring, *Air pollution, Pollution abatement, Sampling, *Pollutant identification.

Aerosols in urban and non-urban locations of California are studied in terms of their physical and chemical properties, their interaction with gases in the atmosphere, and their natural and anthropogenic origins. The amounts of atmospheric aerosol which can be related to primary emissions such as from auto exhausts or stationary sources, and secondary production due to physical and chemical processes taking place in the atmosphere are determined. Major sources of particles and chemically reactive gases which can be related to aerosol pollution and visibility reduction are identified. To characterize the behavior of urban aerosols, the physical and chemical properties of airborne particles are observed simultaneously with meteorological variables including winds, temperature, relative humidity and solar radiation, and trace gases including ozone, nitrogen oxides, ammonia, hydrocarbon vapors, carbon monoxide, hydrogen sulfide, and sulfur dioxide. (See also W74-10947) (Knapp-USGS)
W74-10953

PHYSICAL CHARACTERIZATION OF CALIFORNIA AEROSOLS,
Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
K. T. Whitby, W. E. Clark, V. A. Marple, K. Willeke, and G. M. Sverdrup.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 29-32, 1974. 2 fig, 2 ref

Descriptors: *Aerosols, *Smog, *California, Monitoring, *Air pollution, Pollution abatement, Sampling, Pollutant identification.

In 1972 the physical characteristics of aerosol were measured on several each of background, urban, and source related sites in the State of California as part of the Air Resources Board aerosol characterization study. In addition to meteorological and gas measurements, aerosol were sampled on filters, the Lundgren impactor and several other special samplers. Aerosol size distributions were measured by optical counter, electrical aerosol analyzer, condensation nuclei counter, and rotary impactor. (See also W74-10947) (Knapp-USGS)
W74-10954

PHOTOCHEMICAL AEROSOL FORMATION IN THE ATMOSPHERE AND IN AN ENVIRONMENTAL CHAMBER,
California State Air Resources Board, El Monte.
For primary bibliographic entry see Field 5B.
W74-10955

SULFATE AND NITRATE CHEMISTRY IN PHOTOCHEMICAL SMOG,
Rockwell Science Center, Thousand Oaks, Calif.
G. M. Hidy, B. Appel, W. E. Clark, S. K. Friedlander, and R. Giauque.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 39-41, 1974. A Resources Board Contract No 358.

Descriptors: *Smog, *Air pollution, *California, *Aerosols, *Sulfates, *Nitrates, Sampling, Pollutant identification.

e physical and chemical properties of airborne rticles were observed at several different urban d non-urban sites in California. Meteorological d aerometric variables included such gases as ter vapor, ozone, nitrogen oxides, ammonia, lfur dioxide, hydrogen sulfide and reactive drocarbon vapors. The aerosol samples were llected sequentially at two hour intervals over a enty-four hour period for chemical analysis ng filters and impactors. Much of the total mass ncentration of airborne particles is composed of lfate, nitrate, ammonium, as well as other spe-s. Circumstantial evidence supports the fact t most of the sulfur and nitrogen compounds in rosols originate as gases and are transformed in e atmosphere to aerosols by reactions which are t exclusively photochemical in nature. (See also 74-10947) (Knapp-USGS)
74-10956

IARACTERIZATION AND ANALYSIS OF RBORNE PARTICULATE MATERIAL BY IN-ARED SPECTROSCOPY,
gonne National Lab., Ill. Chemical Engineering v.
T. Cunningham, and S. A. Johnson.
Preprints of Papers Presented at the 167th Na-nal Meeting of the American Chemical Society, ril 1-5, 1974, Los Angeles, Calif: American emical Society, Division of Environmental emistry, Vol 14, No 1, p 42-43, 1974.

escriptors: *Air pollution, *Pollutant identifica-n, *Aerosols, Illinois, California, Sampling, eutron activation analysis, X-ray fluorescence, ame photometry, Chemical analysis.

alysis of the elemental composition of airborne rticulate material can be accomplished in a rou-e manner through the use of neutron activation, ray fluorescence, and atomic absorbtion. There significant variation in the chemistry of airborne rticulates as a function of both particle size and ze. Ammonium and sulfate ions account for the ectra of most stage IV (submicron) samples. rbonate, nitrate, silica and silicate, and drocarbon are clearly present in stage II and III mples. The spectra particles collected on stage II d III frequently have a strong sharp band which assigned to a surface nitrate species. This peak seldom strong in stage IV samples collected in e Chicago area but was important in submicron mples collected in the Los Angeles basin. In neral, the features observed in the spectra of age II and III samples display a variability with ne that is not clearly cyclic and appear to reflect e variability of local winds. This is consistent th the theory that particles greater than about e micron in diameter are introduced into the at-osphere by mechanical mechanisms. (See also 74-10947) (Knapp-USGS)
74-10957

ENSORS FOR WATER AND WASTEWATER ROCESS CONTROL,
orth Carolina Univ., Raleigh. Dept. of Environ-ental Sciences and Engineering.
or primary bibliographic entry see Field 5D.
74-10958

ONITORING THE AQUATIC ENVIRONMENT OR SPECIFIC ORGANIC POLLUTANTS,
nvironmental Protection Agency, Athens, Ga. rveillance and Analysis Div.
W. Loy, Jr., D. W. Brown, and J. H. M. ephenson.
: Preprints of Papers Presented at the 167th Na-onal Meeting of the American Chemical Society, pril 1-5, 1974, Los Angeles, Calif: American emical Society, Division of Environmental emistry, Vol 14, No 1, p 47-53, 1974. 2 fig, 1 tab, ref.

escriptors: *Monitoring, *Pollutant identifica-on, *Gas chromatography, *Mass spectrometry, sticides, Organic matter, *Organic compounds.

Gas chromatograph/mass spectrometer (GC/MS) systems are powerful tools for identifying specific environmental organic pollutants. Computerized GC/MS systems are especially suitable in a service laboratory doing routine monitoring of environmental samples. There are ten regional service laboratories and two National Field Investigation Center laboratories within EPA that have primary responsibility for environmental monitoring, industrial surveys, enforcement actions, and investigation of episodes such as fish kills or taste and odor problems. (See also W74-10947) (Knapp-USGS)
W74-10959

APPLICATION OF MONITORING TECHNOLOGY (FOR ASSURING) DRINKING WATER QUALITY,
National Sanitation Foundation, Ann Arbor, Mich.
For primary bibliographic entry see Field 5F.
W74-10960

WATER QUALITY MONITORING SYSTEMS FOR ENVIRONMENTAL WATER AND INDUSTRIAL EFFLUENT IN JAPAN,
Government Industrial Research Inst., Nagoya (Japan).
For primary bibliographic entry see Field 5G.
W74-10961

WASTE WATER MONITORING PROGRAM BY THE CITY OF NEW YORK,
New York City Environmental Protection Administration. Dept. of Water Resources.
For primary bibliographic entry see Field 5D.
W74-10962

VIRAL QUALITY MONITORING IN THE POLLUTED AQUATIC ENVIRONMENT,
Delaware Univ., Newark. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W74-10963

THE URBAN PLUME OF ST. LOUIS,
Washington Univ., Saint Louis, Mo. Dept. of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 5B.
W74-10964

H2SO4/(NH4)2SO4 AEROSOL: OPTICAL DETECTION IN ST. LOUIS REGION,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. J. Charlson, A. H. Vanderpol, D. S. Covert, A. P. Waggoner, and N. C. Ahlquist.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry Vol 14, No 1, p 78-83, 1974. 1 fig, 1 tab, 11 ref.

Descriptors: *Smog, *Sulfates, *Air pollution, *Aerosols, Central US, *Missouri, Pollutant identification.
Identifiers: *Sulfuric acid, *St. Louis(Mo).

Sulfuric acid and its neutralization products with NH3 exist and often dominate the submicrometer aerosol in and near St. Louis, but these substances may be normal intermediates in the cycling of sulfur through the atmosphere. The lack of dependence of composition on wind direction or synoptic condition suggests that these substances are regionally distributed and are not urban. It is likely that human sources of SO2 dominate based on consideration of known source strengths of sulfur compounds in this region. The sources of SO2 (mainly fossil fuel power plants) are located on a spatial scale of from 10-100 km in Missouri and the surrounding states. These compounds, which dominate the hazes in eastern Missouri, may also extend to the entire midwest. Such visible, turbid air is noted in summer from perhaps Topeka to the East Coast and from Chicago to Little Rock and only really disappears with massive intrusions of Canadian air in winter. (See also W74-10947) (Knapp-USGS)
W74-10965

SO2 OXIDATION MECHANISM IN OLEFIN-NOX-SO2 SMOG,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5B.
W74-10966

DIRECT DETERMINATION OF THE TOTAL ATMOSPHERIC AEROSOL MASS DISTRIBUTION,
Minnesota Univ., Minneapolis.
D. A. Lundgren, and H. J. Paulus.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 88-94, 1974. 2 fig, 5 ref.

Descriptors: *Air pollution, *Aerosols, *Dusts, Sampling, Statistics, *Distribution patterns, Particle size, Turbidity, *Pollutant identification.

The mass distribution of large atmospheric particulate matter was studied as a function of particle aerodynamic size. Aerodynamic size is defined as the diameter of a unit density sphere which settles at the same rate as the actual particle. Measurements were made under various conditions of wind velocity and direction in order to investigate the effect wind and aerosol source had on the mass distribution. Atmospheric particulate matter tends to have a bimodal mass distribution. Based upon the overall average distribution, the small particle mode peaked at about 0.5 micron diameter. For all sampling conditions the atmospheric aerosol had a large particle mode which peaked between 10 and 20 micron diameter. The small particle mode accounts for only one-half the particulate mass but about 99 percent of the particulate surface area and visibility reduction. (See also W74-10947) (Knapp-USGS)
W74-10967

COMPARISON OF VOLUME AND MASS DISTRIBUTION FOR DENVER AEROSOLS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5B.
W74-10968

MASS AND COMPOSITION OF AN URBAN AEROSOL AS A FUNCTION OF SIZE FOR SEVERAL VISIBILITY LEVELS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5B.
W74-10969

NPDES SELF-MONITORING AND REPORTING REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Permit Programs Div.
For primary bibliographic entry see Field 5G.
W74-10970

AUTOMATED WET CHEMICAL ANALYSIS INSTRUMENTS FOR CONTINUOUS EFFLUENT MONITORING,
Technicon Industrial Systems, Tarrytown, N.Y.
For primary bibliographic entry see Field 5D.
W74-10971

USE OF CHEMICAL-SENSING ELECTRODES IN MONITORING,
Orion Research, Inc., Cambridge, Mass.
M. S. Frant.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 119-120, 1974. 2 tab.

Descriptors: *Monitoring, *Water pollution control, *Electrodes, Water analysis, Electrochemistry, Industrial wastes, Waste water treatment, *Pollutant identification.

Currently available chemical-sensing electrodes which are suitable for monitoring are discussed. Electrodes are relatively low cost devices, and have the advantages of responding in real time, of being able (as logarithmic devices) to cover a wide concentration range with the same precision, and of being able to function under adverse conditions of turbidity and color. By suitable chemistry, it is also possible to determine many species for which no specific electrode exists. (See also W74-10947) (Knapp-USGS)
W74-10972

APPLICATION OF ANALYTICAL INSTRUMENTATION TO INDUSTRIAL MONITORING OF AQUEOUS EFFLUENTS,
Union Carbide Corp., South Charleston, W. Va. Dept. of Engineering.
For primary bibliographic entry see Field 5B.
W74-10973

DETERMINATION OF TRACE ORGANIC COMPONENTS IN AQUEOUS WASTES,
Monsanto Co., Saint Louis, Mo.
For primary bibliographic entry see Field 5B.
W74-10974

WATER SAMPLING,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10975

MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM NO I,
Teledyne Triple R, Muskegon, Mich.
For primary bibliographic entry see Field 5D.
W74-10976

ENVIRONMENTAL ANALYSIS OF OCEAN DUMPING,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
For primary bibliographic entry see Field 5B.
W74-10977

INDUSTRIAL WASTEWATER MONITORING: BASIC CONSIDERATIONS,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 5D.
W74-10978

WASTE AND WATER MONITORING,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 5D.
W74-10979

AN AMPEROMETRIC MEMBRANE HALOGEN ANALYZER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. D. Johnson, and J. W. Edwards.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 169-173, 1974. 5 fig, 2 tab. Army Contract No DADA 17-72-C-2053.

Descriptors: *Chlorination, *Monitoring, *Membrane processes, Water analysis, Chemical analysis, Water treatment, Water quality control, Membranes, *Pollutant identification.

If a membrane is used to allow halogen transport while excluding interferents an electrochemical or colorimetric reaction can be used to determine halogen residuals specifically. Halogens, in particular chlorine, are the most widely used chemical agents for water disinfection. Halogen residual measurements are a measure of water safety. These residuals are generally on the order of .2 to 1 mg/liter. (See also W74-10947) (Knapp-USGS)
W74-10980

TRACE ORGANIC CONTAMINANTS IN DRINKING WATER; EVALUATION OF SEMI-PERMEABLE MEMBRANES AND OSMOTIC PUMPING TO ACHIEVE CONCENTRATION,
Gulf South Research Inst., New Orleans, La.
For primary bibliographic entry see Field 5F.
W74-10981

TRACE ORGANIC CONTAMINANTS IN DRINKING WATER; THEIR CONCENTRATION BY REVERSE OSMOSIS,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5F.
W74-10982

TRANSMETHYLATION OF HEAVY METAL IONS IN WATER,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10983

COLORIMETRIC METHOD FOR THE DETERMINATION OF ARSENIC (III) IN AQUATIC ENVIRONMENT,
South Carolina State Coll., Orangeburg. Water Lab.
S. S. Sandhu, and R. Krishnamurthy.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, division of Environmental Chemistry, Vol 14, No 1, p 226-229, 1974. 8 ref.

Descriptors: *Arsenic compounds, *Chemical analysis, *Analytical techniques, Oxidation, Reduction(Chemical), Colorimetry, *Pollutant identification.

A simple analytical method is given for quantitative evaluation of arsenic (III) in an aquatic environment. Arsenic (III) is a reducing agent. Iodate ion is a good oxidizing agent and it is reduced by arsenic (III) to iodine. The liberated iodine is immediately extracted with carbon tetrachloride, which forms a loose complex imparting a characteristic pink color to the extractant. Iodine in organic phase is colorimetrically evaluated and arsenic (III) calculated. (See also W74-10947) (Knapp-USGS)
W74-10984

THE CARBON ROD ATOMIC ABSORPTION ANALYSIS OF ARSENIC IN PLANT AND ANIMAL TISSUES,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
R. Baird, and S. Gabrielian.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 230-233, 1974. 3 tab, ref.

Descriptors: *Flame photometry, *Spectrophotometry, *Arsenic compounds, *Pollutant identification, *California, Path of pollutants, Chemical analysis.
Identifiers: Atomic absorption spectrophotometry, Los Angeles County(Calif).

Carbon rod techniques for atomic absorption were successfully employed for the analysis of arsenic in wastewaters, sediments, plants, and marine animals. Lyophilization followed by acid digestion (ambient pressure) or acid bomb digestion (high pressure) offers the most promising methods for preparing representative biological samples for atomic absorption analysis of arsenic. There is no clear gradient of arsenic concentrations in fish and shellfish specimens collected around the Los Angeles County Palos Verdes sewage outfall. The levels of arsenic found in brown algae (kelp) specimens seem to be higher near the point of discharge. (See also W74-10947) (Knapp-USGS)
W74-10985

EVALUATION OF DIGESTION TECHNIQUES FOR THE AAS DETERMINATION OF META CONCENTRATIONS IN KELP,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
S. Pourian, M. Smith, S. Gabrielian, and R. Baird.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 237-244, 1974. 3 tab, ref.

Descriptors: *Flame photometry, *Spectrophotometry, *Arsenic compounds, *Pollutant identification, *California, Path of pollutants, Chemical analysis.
Identifiers: Atomic absorption spectrophotometry.

Approximately half of the metal loadings in the Southern California coastal waters result from the discharge of treated domestic and industrial wastes from sewage treatment plants. Kelp stands near the major Los Angeles County outfall contain metal concentrations significantly higher than those farther away from the discharge point. In order to differentiate between the concentration of cellular metals and surface-absorbed metals the washing technique does not leach metals from the cells. Atomic absorption spectroscopy is the analytical tool used. (See also W74-10947) (Knapp-USGS)
W74-10986

THE FLOW OF TRACE ELEMENTS THROUGH THE LOS ANGELES BASIN: ZN, CD, AND NI,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
For primary bibliographic entry see Field 5B.
W74-10987

DETERMINATION OF CHLORINATION EFFECTS ON ORGANIC CONSTITUENTS IN SEWAGE TREATMENT PLANT EFFLUENTS: COUPLED 36CL TRACER--HIGH-RESOLUTION CHROMATOGRAPHIC TECHNIQUE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-10989

LIGHT ENERGIZED OXIDATION OF ORGANIC WASTES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 5D.
W74-10990

HE DETERMINATION OF BENZIDINE IN
/ASTEWATERS,
os Angeles County Sanitation Districts, Whittier,
alif. San Jose Creek Water Quality Lab.
. Jenkins, C. Kuo, and R. Baird.
: Preprints of Papers Presented at the 167th Na-
onal Meeting of the American Chemical Society,
pril 1-5, 1974, Los Angeles, Calif: American
hemical Society, Division of Environmental
hemistry, Vol 14, No 1, p 273-277, 1974. 6 ref.

escriptors: *Organic compounds, Chromatography, *Spectrophotometry, Pollutant identification, Waste water treatment, nalytical techniques, Chemical analysis.
ientifiers: *Benzidine.

he most useful technique for the estimation of enzidine in wastewater is a colorimetric deter-ination of aniline derivatives. Although thin yer chromatography (TLC) and gas-liquid chro-atography have not been described specifically r the analysis of benzidine in aqueous systems, ey present possibilities as analytical tools. ualitative IR identifications of benzidine and her aromatic amines were performed on a spec-ophotometer which was fitted with a beam con-enser having KBr optics. Compounds developed y TLC were extracted from Silica Gel G with 2 ml spectrograde methanol, and concentrated to 0.5 l. From 5-10 microliters of this extract were rectly administered to dried spectroscopic grade Br in a 1.5 mm ultra-micro pellet die before vacuation and pressing. This technique was capa-e of producing satisfactory spectra on as little as microgram of benzidine using a 20x scale expan-on of the instrument. For identification, spectra ere compared to 1-10 microgram benzidine stan-rds prepared in 1.5 mm pellets. (See also W74-0947) (Knapp-USGS)
/74-10991

HEMICAL PROFILES OF KRAFT PAPER
ILL TREATED WASTEWATERS,
nvironmental Protection Agency, Athens, Ga.
outheast Environmental Research Lab.
or primary bibliographic entry see Field 5D.
/74-10992

OAL HUMATES FOR THE REMOVAL OF
/ATER POLLUTANTS ASSOCIATED WITH
HE USE OF COAL,
lissouri Univ., Columbia. Dept. of Chemistry.
or primary bibliographic entry see Field 5D.
/74-10993

HE ELEMENTAL COMPOSITION OF THE
EROSOL IN PASADENA, CALIFORNIA,
ord Motor Co., Dearborn, Mich. Dept. of
hemistry.
. H. Hammerle, and W. R. Pierson.
: Preprints of Papers Presented at the 167th Na-
onal Meeting of the American Chemical Society,
pril 1-5, 1974, Los Angeles, Calif: American
hemical Society, Division of Environmental
hemistry, Vol 14, No 1, p 285-286, 1974.

escriptors: *Air pollution, *Dusts, Fallout, erosols, *California, Lead, Nickel, Zinc, Calci-m, Bromine, *Pollutant identification.
dentifiers: Pasadena(Calif).

o determine the sources of the aerosol in asadena, California, particulate samples were ollected almost continuously for 29 days from 30 ctober to 27 November, 1972. Two filters, which ere changed simultaneously every 2 hours, were sed to collect particles in 2 size ranges: from bout 20 microns to 0.01 microns and from 1.5 icrons to 0.01 microns in diameter. The elemen-al compositions of the two sets of filters were nalyzed by an X-ray fluorescence spectrometer. b and Br meet criteria for automobile exhaust articulates, and Fe, Ti, and Mn meet criteria for oil dust. Ni and Zn come from 2 different sources, different from one another and different from automobile exhaust and soil dust. It appears likely that the measured Ca, above that expected from the soil dust, comes from cement and that the Ni comes from fuel oil fly ash. Primary automobile exhaust particulate matter contibutes 17% of the total particulate mass, soil dust contributes 26%, cement dust contributes less than 1%, fuel oil fly ash contributes about 2%. The average particulate mass during the November 16-27 period was 31.7 micrograms per cu m. (See also W74-10947) (Knapp-USGS)
W74-10994

A SPECTROSCOPIC STUDY OF PASADENA SMOG,
National Environmental Research Center, Research Triangle Park, N.C.
P. L. Hanst, W. E. Wilson, R. K. Patterson, B. W. Gay, and L. W. Chaney.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 287-294, 1974. 5 fig, 1 tab.

Descriptors: *Air pollution, *Smog, *California, Nitrates, Organic compounds, Sampling, *Spectroscopy, Infrared radiation, Ozone, Pollutant identification.
Identifiers: Pasadena(Calif).

An application of long path infrared spectroscopy to air pollution in Pasadena yielded data of value in interpreting the chemistry of the smog. In the late summer of 1972 a Fourier Transform spectrometer and long path cell were set up on the roof of the Keck Engineering Building at the California Institute on Technology. In the summer period the carbon monoxide and hydrocarbon levels were about half as high as on Fall mornings and evenings. On July 24 and 25, 1973, ozone concentrations reached 0.60 and 0.68 ppm. On those days, carbon monoxide was only about 3 ppm, methane 2 ppm, and non-methane hydrocarbon about 1.0 ppm carbon. Acetylene was 0.030 ppm and ethylene only 0.007 ppm, reflecting the stagnant condition of the air and the high extent of reaction. Formic acid was identified as the organic reaction product in highest concentration, at 0.050 ppm. A substantial portion of the hydrocarbon in the air was oxidized by the end of the day. Because the only gaseous nitrate was peroxy acetyl nitrate, which only accounts for about one-fourth of the input NO, it is presumed that particulate nitrate was formed. (See also W74-10947) (Knapp-USGS)
W74-10995

PHOTOCHEMICAL REACTIONS IN A DUAL OUTDOOR SMOG CHAMBER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
H. Jeffries, D. Fox, R. Kamens, and L. Ripperton.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 295-297, 1974. 1 fig.

Descriptors: *Air pollution, *Chemical reactions, Equipment, Sampling, Solar radiation, Monitoring, Pollutant identification.

A dual smog chamber is enclosed by clear 5 mil PEP Teflon film. The chamber allows the reactants to be exposed to ambient sunlight and temperature profiles as they exist during the daytime. By having two compartments exposed to the same ambient conditions, it is possible to measure directly the effects of different reactant concentrations. The facility is designed to investigate the chemical behavior of urban atmospheric pollution. (See also W74-10947) (Knapp-USGS)
W74-10996

KINETIC STUDIES OF THE STABILITIES OF CHLOROMETHYL METHYL ETHER AND BIS (CHLOROMETHYL) ETHER IN HUMID AIR,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 5B.
W74-10997

CARBON-MONOXIDE-INDUCED PARTICLES FROM HOPCALITE CATALYST,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-10998

THE PRODUCTION RATE OF SULFATE AEROSOL IN THE STRATOSPHERE: ENVIRONMENTAL IMPLICATIONS OF A STRATOSPHERIC AIRCRAFT FLEET,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
For primary bibliographic entry see Field 5B.
W74-10999

DETECTION OF HYDROCARBONS BY CHEMILUMINESCENCE WITH ACTIVE NITROGEN AT 388 NM,
Environmental Protection Agency, Research Triangle Park, N.C.
T. W. Baity, W. A. McClenny, and J. P. Bell.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 310-312, 1974. 2 tab.

Descriptors: *Monitoring, *Air pollution, Smog, Organic compounds, Nitrogen, Instrumentation, Fluorescence, Analytical techniques, Pollutant identification.
Identifiers: *Chemiluminescence.

A chemiluminescent method measures the hydrocarbon levels in a gas sample by the intensity of the individual hydrocarbon reactions with active nitrogen. Of all the hydrocarbons tested propylene gave the largest response. At 100 ppm the signal for propylene is about ten times greater than the background signal measured with zero air in the sample inlet. Since the minimum measurable concentration of even the more responsive hydrocarbons is greater than 1 ppm, the system in present form is suitable only for mobile source emissions measurements, and not for ambient air monitoring. (See also W74-10947) (Knapp-USGS)
W74-11000

A COLORIMETER SYSTEM FOR DETERMINATION OF THE METHOD 6 THORIN TITRATION ENDPOINT,
National Environmental Research Center, Research Triangle Park, N.C.
C. E. Rodes.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 313-320, 1974. 4 fig, 2 tab, 2 ref.

Descriptors: *Air pollution, *Pollutant identification, *Sulfates, *Volumetric analysis, *Color reactions, Monitoring, Sulfur.
Identifiers: *Sulfur dioxide.

The analysis of stack concentrations of SO2 has always been uncertain especially when the analyses must be made in the field. Consistent determination of the thorin titration endpoint, in which the solution color changes from a straw yellow to a pink-orange is difficult. An automatic titrator was designed to assist in determining the endpoints, and to speed up the analyses of multiple samples. A strip chart recorder is used with a peristaltic pump. A simple endpoint detection system is rugged enough to take into the field. (See also W74-10947) (Knapp-USGS)

W74-11001

OPERATION CHARACTERISTICS OF NO2 PERMEATION DEVICES,
National Bureau of Standards, Washington, D.C.
H. L. Rook, E. E. Hughes, R. S. Fuerst, and J. H. Margeson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 321-328, 1974. 6 fig, 1 tab, 7 ref.

Descriptors: *Chemical analysis, *Nitrogen compounds, *Air pollution, *Pollutant identification, Separation techniques.
Identifiers: *Nitrogen dioxide.

Permeation devices can produce reliable calibration atmospheres of trace NO2 if careful controls are replaced on the gravimetric calibration and use of the devices. Conditions which would effect permeation rate and long term stability were studied. Parameters studied include temperature, humidity, physical shock, NO2 purity, and calibration procedures. (See also W74-10947) (Knapp-USGS)
W74-11002

A PIEZOELECTRIC SENSOR FOR MERCURY IN AIR,
National Bureau of Standards, Washington, D.C.
E. P. Scheide, and J. K. Taylor.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 329-335, 1974. 4 fig, 9 ref.

Descriptors: *Air pollution, *Pollutant identification, *Mercury, *Monitoring, Instrumentation.
Identifiers: *Piezoelectric sensors.

A quartz piezoelectric crystal detector with gold on the electrode as the sensor substrate can be used for the detection of mercury vapor in an air sample. Linear calibration curves were obtained from part per million to sub part per billion concentrations. Reversibility was achieved by a heat desorption cycle. This detector has potential use as both an air pollution sensor and in industrial hygiene applications. Instrumentation is relatively inexpensive and can be easily used in the field. Analysis is nondestructive and requires very little time. (See also W74-10947) (Knapp-USGS)
W74-11003

THE FLUORESCENCE DETECTION OF NITRIC OXIDE,
National Bureau of Standards, Washington, D.C.
F. P. Schwarz, and H. Okabe.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 336-343, 1974. 2 fig, 2 tab, 6 ref.

Descriptors: *Monitoring, *Air pollution, Smog, Organic compounds, Nitrogen, Instrumentation, Fluorescence, Analytical techniques, Oxides, *Pollutant identification.
Identifiers: *Chemiluminescence, Nitric oxide.

NO can be detected in NO-air mixtures and in automobile exhaust. The principle of detection is based on measuring the intensity of the fluorescence of NO excited by light of wavelength 2138A. The fluorescence intensity is proportional to the product of the NO concentration multiplied by the 2138A light intensity. Photon counts of both the fluorescence intensity and the 2138A light intensity are converted into a ratio which is proportional only to the NO concentration in a gas mixture. The SO2 present in automobile exhaust also absorbs the 2138A radiation but fluoresces at a longer wavelength region. It would not interfere with the NO measurement if a proper fluorescence transmission filter is used. (See also W74-10947) (Knapp-USGS)
W74-11004

CHEMICAL ANALYSIS OF THE SMOKY-BURNT ODOR COMPLEX IN DIESEL EXHAUST,
Little (Arthur D.), Inc., Cambridge, Mass.
A. B. Caragay, D. A. Kendall, and P. L. Levins.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 344-349, 1974. 2 tab, 2 ref.

Descriptors: *Air pollution, *Odor, *Organic compounds, Oil, Air pollution effects, *Pollutant identification, *Chemical analysis.

The smoky odor character of diesel exhaust is associated with hydroxy and methoxy indanones with some contributions from methyl and methoxy phenols. Burnt odors are associated with furans and alkyl benzaldehydes. The oxidized oily character is usually ascribed to alkenones, dienones, hydroxy cyclocarbonyls, and indanones. Irritation factors seem most frequently to be associated with the lower molecular weight phenols. Some benzaldehydes and methoxy benzenes may also contribute to this sensation. Neither sulfur nor nitrogen-containing species contribute to the smoky-burnt odor complex. The major source of the most significant odor contributors in this group appears to be the aromatic portion of the fuel, although some contribution is also from the paraffin portion. (See also W74-10947) (Knapp-USGS)
W74-11005

CARCINOGENIC SOURCES IN FISH TUMORS FOUND IN THE FOX VALLEY WATER SHED,
Illinois Benedictine Coll., Lisle.
For primary bibliographic entry see Field 5C.
W74-11006

AN AUTOMATED INSTRUMENT FOR THE CONTINUOUS MEASUREMENT OF REACTIVE HYDROCARBONS,
Ontario Research Foundation, Sheridon Park.
S. C. Barton, and E. N. Turner.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 356-359, 1974. 1 fig, 9 ref.

Descriptors: *Monitoring, *Air pollution, *Organic compounds, Smog, Colorimetry, Chemical reactions, Radioactive wastes, *Pollutant identification, Instrumentation, Automation.
Identifiers: *Radioactive hydrocarbon.

A method for monitoring reactive hydrocarbons is based upon the relative reactivity of different hydrocarbons with ozone. An air sample flows through a small photochemical reactor in which all hydrocarbons react in proportion to their photochemical reactivity to form aldehydes and ketones as major reaction products. Colorimetric determination of the total carbonyl products then provides a direct measurement of the total photochemical reactivity of the hydrocarbons in the air. (See also W74-10947) (Knapp-USGS)
W74-11007

INTERCOMPARISON OF SEVERAL TYPES OF CASCADE IMPACTORS,
Maryland Univ., College Park. Dept. of Chemistry.
G. E. Gordon, E. S. Gladney, J. M. Ondov, T. J. Conry, and W. H. Zoller.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 367-370, 1974. 1 fig, 9 ref.

Descriptors: *Sampling, *Dusts, *Aerosols, *Air pollution, Equipment, Calibrations, Particle size, *Pollutant identification.
Identifiers: *Cascade impactors.

Size distribution of atmospheric particles is found by separation of the particles into various size ranges with a cascade impactor prior to the analysis. This study is designed to determine the seriousness of wall losses and bounce-off for three types of impactors in common use. In the first series of experiments, three types of impactors and a filter were run side by side for comparison of apparent size distributions for certain elements. Then two identical impactors were run side by side, one with plastic collections surfaces, the other with plastic to which a sticky material had been added in order to prevent bounce-off. The three impactors were: a 4-stage Lundgren, a five-stage Andersen Sampler as modified for use by the National Air Surveillance Network, and a six-stage Scientific Advances Impactor. (See also W74-10947) (Knapp-USGS)
W74-11008

A NATIONAL OVERVIEW OF EXISTING COASTAL WATER QUALITY MONITORING.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
Available from NTIS, Springfield, Va 22161 as PB-226 483, Price $10.00 printed copy; $2.25 microfiche. Contract Report 445-A, Phase A, for Environmental Protection Agency, December 6, 1972. 514 p, 9 fig, 35 tab, 15 append. EPA Contract 68-01-0160.

Descriptors: *Monitoring, *Water quality, *Coasts, *Estuaries, Sea water, Water pollution sources, Water pollution control, *Data collections.

An overview of coastal water quality monitoring activity is presented, including an examination of related factors such as water quality standards, population, waste discharges, ocean dumping, and a survey of data banks at the national level. This broadly based information, supported by detailed data from selected case study areas, is for use in the formulation of a national plan for monitoring coastal water quality. Data from several inventories pertinent to coastal zone water quality are summarized to the state and EPA regional level with extensive descriptions contained in appendices. In general, no significant correlative relationship was found between monitoring activities and any of the other factors studied. However, a large amount of data was accumulated, summarized and presented in a form useful in the management and planning of coastal zone water quality monitoring networks. (Knapp-USGS)
W74-11010

CTD SENSORS, SPECIFIC CONDUCTANCE AND THE DETERMINATION OF SALINITY,
North Carolina State Univ., Raleigh. Inst. of Marine Sciences.
For primary bibliographic entry see Field 7B.
W74-11033

THE USE OF AN ELECTRON CAPTURE DETECTOR FOR THE DETERMINATION OF PESTICIDES IN WATER,
Ustav Hygieny, Bratislava (Czechoslovakia).
J. Uhnak, M. Sackmauera, A. Szokolay, and O. Palusova.
Journal of Chromatography, Vol 91, p 545-547, April 24, 1974. 10 ref.

escriptors: *Chlorinated hydrocarbon pesticides, nstrumentation, Analytical techniques, DDT, ivers, Europe, Groundwater.
dentifiers: BHC, Hexachlorocyclohexane, zechoslovakia, Danube.

races of chorinated insecticides in water could be etermined with an electron capture detector hich gave a linear response for BHC (benzene exachloride, hexachlorocyclohexane) and DDT omers and metabolites in the range from 0.03 to 20 microgram/ml. The BHC and DDT contents in lovakian rivers ranged from 0.01 to 0.80, in the anube from 0.01 to 0.60, and in ground waters om 0.02 to 0.30 microgram/liter in the years 971/72. The DDT content was lower than the con- nt of BHC residues. These results agree with the ctual consumption of chlorinated insecticides in ie agricultural areas studied. (Brown-IPC)
/74-11077

PDC-MIBK EXTRACTION SYSTEM FOR THE ETERMINATION OF COPPER AND IRON IN CU CM OF SEA WATER BY FLAMELESS TOMIC-ABSORPTION SPECTROMETRY,
iel Univ. (West Germany). Institut fuer leereskunde.
. Kremling, and H. Petersen.
nalytica Chimica Acta, Vol 70, No 1, p 35-39, lay 1974. 2 fig, 2 tab, 8 ref.

escriptors: *Copper, *Iron, *Analytical chniques, *Seawater, Spectrophotometry, helation, Separation techniques.
dentifiers: Atomic absorption spectrometry.

method for the simultaneous determination of ace amounts of Cu and Fe in 1 ml samples of ceanic waters is described. It is based on the ielation of the metals with ammonium pyr- olidine dithiocarbamate (APDC), extraction of ie chelates with methyl isobutyl ketone (MIBK), nd flameless atomic-absorption spectrometry ith a HGA-72 graphite atomizer. Replicate nalyses of Atlantic ocean water with mean Cu nd Fe concentrations of 1.6 and 3.5 micro- ram/liter showed standard deviations of 14 and 7%, respectively. (Brown-IPC)
/74-11078

POTENTIOMETRIC METHOD FOR THE ETERMINATION OF CHLORIDE IN BOILER VATERS IN THE RANGE 0.1 TO 10 MICRO- RAM PER ML OF CHLORIDE,
entral Electricity Generating Board, Leather- ead (England). Central Electricity Research Lab.
. Torrance.
he Analyst, Vol 99, No 1177, p 203-210, April 974. 1 fig, 7 tab, 5 ref.

escriptors: *Water analysis, *Boiler feed water, Chlorides, *Analytical techniques, Electrodes, otentiometers, Instrumentation, Corrosion con- ol, Inhibition, Additives, Industrial water, Water urification, Monitoring, Water quality control.

microanalytical method for measuring trace mounts of chloride ions in boiler feed waters is escribed, which utilizes the potential of a g/AgCl wire electrode vs. a Hg(I) sulfate eference electrode immersed in a buffered solu- on of the sample. The method was tested for hloride concentration ranges from 0.1 to 10.0 icrograms per ml. Standard deviations of results f 0.1, 1.76, and 10.0 micrograms/ml were 0.04, 06, and 0.2 microgram/ml, respectively. Sub- ances normally present in boiler water do not ap- reciably interfere with chloride potentiometry, ut octadecylamine and similar corrosion inhibi- rs would make the method unsuitable. (Brown- PC)
/74-11079

NALYSES OF PAPER MACHINE WATERS ITH ION-SPECIFIC ELECTRODES. PART I. EFFECT OF PH AND IONIC STRENGTH OF SOLUTION ON CALCIUM, CUPRIC, CHLORIDE, SODIUM, AND NITRATE ION SPECIFIC ELECTRODES,
Valmet Oy, Jyaskyla (Finland).
J. Korhonen, P. O. Lumme, and L. J. Kinnunen.
Paperi ja Puu (Papper och Tra), Vol 55, No 8, p 559-561, 564-566, 569-570, Aug 1973. 11 fig, 10 tab, 9 ref.

Descriptors: Water analysis, Waste water(Pollution), Analytical techniques, *Electrodes, *Anions, *Cations, *Potentiometers, *Pulp wastes, Water pollution sources, *Pollutant identification, Instrumentation, Hydrogen ion concentration, Industrial water, Industrial wastes, Calibration, Ions, Chemical analysis, Calcium, Chlorides, Copper, Sodium, Nitrates, Thermodynamics.
Identifiers: *White water(Paper machine effluent), Concentration(Chemicals), Ionic strength.

The purpose of this study was to measure the concentrations of various cations and anions that are generally present in paper-machine waste waters (white water), using ion-specific electrodes, and to define the factors influencing electrode calibration and direct concentration measurements. After an initial examination of the pH dependence of electrode potentials, the results were used to estimate the pH ranges in white waters over which the electrode behavior was independent of pH. The effect of ionic strength on electrode response was also explored. Electrode potentials were shown to follow the ionic activity factor's dependence upon ionic strength. (See also W74-11094) (Brown-IPC)
W74-11093

ANALYSES OF PAPER MACHINE WATERS WITH ION-SPECIFIC ELECTRODES, PART II. CALCIUM, CUPRIC, CHLORIDE, SODIUM AND NITRATE ION SPECIFIC ELECTRODE POTENTIALS AT VARIOUS TEMPERATURES AND IN COMPOSITE SOLUTIONS,
Valmet Oy, Jyaskyla (Finland).
J. Korhonen, P. O. Lumme, and L. J. Kinnunen.
Paperi ja Puu (Papper och Tra), Vol 55, No 9, p 646-648, 651-652, 655-656, Sept 1973. 4 fig, 9 tab, 7 ref.

Descriptors: Water analysis, Waste water(Pollution), Analytical techniques, *Electrodes, *Anions, *Cations, *Potentiometers, *Pulp wastes, Water pollution sources, *Pollutant identification, Instrumentation, Temperature, Thermal pollution, Calibrations, Ions, Chemical analysis, Calcium, Chlorides, Copper, Sodium, Nitrates, Industrial water, Water sampling.
Identifiers: *White water(Paper machine effluent), Concentration(Chemicals).

The effect of temperatures typical of white waters (paper machine effluent) on the electrode potentials of various contaminant ions (Ca, Cu, Na, chloride, and nitrate) was measured in order to estimate the admissible standard and sample temperature differences. Interferences were studied by measurements in pure metal chloride and sodium salt solutions. The accuracy of the electrodes was tested in a synthetic white water formulation. Based on the results obtained, recommendations are made for achieving maximum accuracy in direct concentration measurements. (See also W74-11093) (Brown-IPC)
W74-11094

THE DETERMINATION OF VANADIUM IN SEA WATER BY HOT GRAPHITE ATOMIC ABSORPTION SPECTROMETRY ON CHITOSAN AFTER SEPARATION FROM SALT,
Bologna Univ. (Italy).
R. A. A. Muzzarelli, and R. Rocchetti.
Analytica Chimica Acta, Vol 70, No 2, p 283-289, June, 1974. 3 fig, 3 tab, 9 ref.

Descriptors: *Sea water, *Analytical techniques, *Water analysis, *Chemical analysis, *Pollutant identification, Water pollution, Ion exchange, Trace elements, Water chemistry, Metals, Spectrometers, Anion exchange.
Identifiers: *Vanadium, Chitosan, *Italy(Cape Conero).

A method has been developed for the determination of V in sea water. It is based on the anion-exchange behavior of chitosan toward the metavanadate ion. Filtered and acidified sea water is passed through a 500mg chitosan column, and the V is determined by atomic absorption spectrometry with a graphite furnace and a deuterium background corrector on 5mg aliquots of the homogenized column. The procedure is suitable for use on board ships, as many samples can be handled by one technician; the columns can run unattended and can be sealed and stored for later analysis. Because only a small aliquot of the polymer from a column is used for a determination, replicate analyses can be done on the same column, and the residue can be stored indefinitely. Vanadium can be eluted from a chitosan column with sulfuric acid or ammonia, and the column can be used again. Two sea water samples collected a few km offshore of Cape Conero, Ancona, Italy, gave 0.71 plus or minus 0.09 and 0.52 plus or minus 0.04 micrograms of V/l. (Witt-IPC)
W74-11109

FLUORIMETRIC DETERMINATION OF CARBOHYDRATES IN SEA WATER,
Kinki Univ., Osaka (Japan). Dept. of Fundamental Education.
H. Hirayama.
Analytica Chimica Acta, Vol 70, No 1, p 141-148, May 1974. 4 fig, 3 tab, 12 ref.

Descriptors: *Water analysis, *Sea water, *Carbohydrates, Fluorescence, Biochemical oxygen demand, Solutes, Activated carbon, Adsorption, Electrodialysis, Ion exchange, Desalination, Sewage, Fluorescence, Spectroscopy, Analytical techniques, Waste identification, *Pollutant identification.
Identifiers: Hexoses, Pentoses, Furfural, Glucose.

Fluorimetry of pentoses with anthrone and of hexoses with 5-hydroxy-1-tetralone was used for analysis of sea water after preliminary separation of these sugars by adsorption on activated carbon and by ion-exchange electrodialysis. Activated carbon was suitable for the separation and concentration of hexose sugars but not of pentoses. Electrodialysis allowed complete desalination without loss of carbohydrates. The pentose and hexose contents could be determined after evaporation of sea water under reduced pressure. Several sea water samples were thus analyzed. Their pentose content (expressed as furfural) was 225-288 microgram/l, but their hexose content (expressed as glucose) varied widely from 250 to 1670 microgram/l, owing to contamination by sewage. (Brown-IPC)
W74-11110

MAKE WATER POLLUTION CONTROL A MEANINGFUL LOCAL RESPONSIBILITY,
Muncie Sanitary District, Ind., Water Quality Div.
J. M. Craddock.
The American City, Vol 63, No 4, p 63-64, May, 1974.

Descriptors: *Water quality control, *Monitoring, *Laboratory testing, Environmental effects, Pollution, Chemical oxygen demand, Dissolved solids, Suspended solids, Jar testing, Vacuum filters, Industrial wastes, Biochemical oxygen demand, Water resources, Costs, *Regulation, *Pollutant identification, *Indiana.
Identifiers: Local control, *Muncie(IN).

The Muncie Sanitary District has established a Division of Water Quality. The division is a testing and enforcement agency involved in laboratory

testing, industrial monitoring, and local government. Laboratory equipment includes an oil-extraction unit, COD apparatus, a pH meter, vacuum filter for suspended solids, jar test equipment, field dissolved oxygen meters, and automatic field samplers. More than 20 pollution discharges have been stopped. Because about 80 industrial and commercial establishments are in the Muncie area, samplers now monitor BOD5, COD, heavy metals, and suspended solids. Benefits relate to the community's public health, added recreational value of water resources, added revenue through equitable waste-industry charges, and regulation by local rather than state and federal agencies. (Prague-FIRL)
W74-11120

A STUDY OF THE POSSIBILITY OF INDICATING BACTERIA IN WATER BY A SPECTROULTRAMICROSCOPIC METHOD, (IN RUSSIAN),
Academy of Municipal Economy, Moscow (USSR). Research Inst. of Public Water Supply, Water Purification.
V. N. Artemova.
Gig Sanit. Vol 37 No 9 p 75-78, 1972. Illus.

Descriptors: *Electron microscopy, Filters, Bacteria, *Analytical techniques, *Bioindicators, Pollutant identification.
Identifiers: Bacillus anthracoides, Bacillus mesentericus, Escherichia coli, Shigella sonnei, Streptococcus faecalis.

An apparatus based on electronmicroscopy and fractional analysis with special light filters can be used to differentiate bacteria from each other and from other particles. This method is tested on water seeded with Escherichia coli, Shigella sonnei isolated from patients, Streptococcus faecalis, Bacillus mesentericus and B. anthracoides. Each bacteria appeared in a specific fraction except for Str. faecalis and B. mesentericus which, due to agglomeration or the presence of various stages of spore formation, appeared in several areas. This method could possibly be automated.--Copyright 1974, Biological Abstracts, Inc.
W74-11121

MERCURY ORGANIC MATTER ASSOCIATIONS IN ESTUARINE SEDIMENTS AND INTERSTITIAL WATER,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-11122

HISTORY OF METAL POLLUTION IN SOUTHERN CALIFORNIA COASTAL ZONE,
Scripps Institution of Oceanography, La Jolla, Calif.
K. W. Bruland, K. Bertine, M. Koide, and E. D. Goldberg.
Environmental Science and Technology, Vol 8, No 5, p 425-432, May, 1974. 3 fig, 7 tab, 10 ref.

Descriptors: *Metals, *Pollution, *Sediments, *Measurements, Analytical techniques, Lead, Zinc, Chromium, Silver, Sampling, Water pollution, Human resources, Storm runoff, Coastal areas, Environmental effects, Atmosphere, *California, *Pollutant identification.
Identifiers: San Pedro(CA), Santa Monica(CA), Santa Barbara(CA), Anthropogenic fluxes.

Measurements were made of the anthropogenic and natural fluxes of elements into the sediments of the San Pedro, Santa Monica, and Santa Barbara Basins, off the coast of Southern California. Elements included Pb, Cr, Cd, Zn, Cu, Ag, V, and Mo. Use of the sedimentary record to reveal metal fluxes to the environment is dependent upon rapid removal of metal from water following its entry. By identifying those elements whose fluxes to the sediments as a result of human activities are significant compared with natural mobilization rates, transport paths from the continents to the sediments for individual elements are indicated. These account for waste outfalls, river and storm runoff, and composition of the atmosphere. Conclusions include marked similarity in the anthropogenic sedimentary fluxes and the rainfall fluxes, indicative that atmospheric transport of these metals to the coastal areas and the area of the Soledad Basin are a possible explanation. (Prague-FIRL)
W74-11130

MERCURY CONTAMINATION OF VEGETATION DUE TO THE APPLICATION OF SEWAGE SLUDGE AS A FERTILIZER,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering; Toronto Univ. (Ontario). Dept. of Geology; and Toronto Univ. (Ontario). Dept. of Chemistry.
J. C. Van Loon.
Environmental Letters, Vol 6, No 3, p 211-218, 1974. 1 tab, 7 ref.

Descriptors: *Vegetation, *Mercury, *Sewage sludge, *Contamination, Soil contamination, Experimentation, Soil surfaces, *Tomatoes, Absorption.
Identifiers: Washed materials.

Vegetation grown on sludged and control plots were tested for mercury content. Washed and unwashed samples were tested. Materials tested included leaves and seeds of wild barley and quack grass; tomato roots, plants and fruit; bean roots, plants and pods; carrot roots and tops; and lettuce leaf. Only tomato fruit showed an increase in mercury levels for the washed plant material from the sludged plot. In this case, levels were up to fifty times higher than those of specimens from unsludged plots. Further investigation is recommended of surface contamination of vegetation by mercury containing dusts and soils which can cause elevated levels in unwashed material. (Prague-FIRL)
W74-11133

A METHOD FOR RAPID IDENTIFICATION OF TYPHOID AND DYSENTERY BACTERIA IN WATER,
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W74-11162

HYGIENIC STANDARDIZATION OF THE PERMISSIBLE URANIUM CONTENT IN DRINKING WATER, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
Yu. V. Novikov.
Gig Sanit. Vol 37, No 9, p 13-17, 1972. English summary.
Identifiers: *Uranium.

Hygienic investigations tried to substantiate scientifically the annual average permissible concentration (APC) of uranium in water for individual persons in the population at the level of 1.8 mg/l.--Copyright 1974, Biological Abstracts, Inc.
W74-11185

FLUORESCENCE SPECTROSCOPIC DETERMINATION OF ANTI-OVULATORY STEROIDS IN WATER AND WATER AND WASTE WATER ON THE THIN LAYER CHROMATOGRAPHY PLATE, (IN RUSSIAN),
Muenster Univ. (West Germany). Hygiene-Institut.
M. Kirchner, H. Holsen, and K. Norpoth.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med Vol 157, No 1, p 44-52, 1973. Illus. English summary.

Descriptors: *Chromatography, *Fluorescence, Spectroscopy.
Identifiers: Chlormadinone acetate, Ethinyl es
tradiol, Ethynodiol, Lynestrenol, Medroxy
Megestrol, Mestranol acetate, Norethisterone
Noregestrel, Progesterone, Steroids.

Anti-ovulatory steroids can be determined quan
titatively and qualitatively from aqueous media or
the thin-layer chromatography plate by means o
fluorescence spectroscopy. The procedure wa
tested for all the steroid components of anti-ovula
tory preparations available in the Federal republi
of Germany (ethinylestradiol, ethynodio
diacetate, chlormadinone acetate, lynestrenol
medroxyprogesterone acetate, megestrol acetate
mestranol, norethisterone acetate and norgestrel
With the exception of ethynodiol diacetate) all th
compounds were clearly identified chromato
graphically because of their stability in doubl
distilled water. The evaluation of the chromato
gram with the Zeiss PMQ II spectrophotomete
and Metrawatt's Servogor Recorder produce
linear calibration functions in the lower nmol
range. Megestrol acetate, which responded par
ticularly sensitively, could still be detected quan
titatively in amounts of 5-10 ng. The analytica
method attains an accuracy of measurement o
plus and minus 5% with triple determinations wit
the use of reference substances. In the determina
tion of steroids in aqueous solutions, the loss o
substance can amount to 8% of the expecte
value. The method has proved useful in ascertain
ing solubility in water and in various waste wate
tests as well as in the study of the decompositio
of estrogens and progestagens in activated sludge.
-Copyright 1974, Biological Abstracts, Inc.
W74-11195

WATER QUALITY PARAMETER MEASUREMENT USING SPECTRAL SIGNATURES,
Texas A and M Univ., College Station. Remot
Sensing Center.
P. E. White.
Available from NTIS, Springfield, Va 22161 a
N73-25141, Price $5.75 printed copy; $2.2
microfiche. Technical Report RSC-42, May 1973
159 p, 25 fig, 23 tab, 23 ref, append. NASA Gran
NGL 44-001-001.

Descriptors: *Remote sensing, *Water quality
*Regression analysis, Water pollution, Path of pol
lutants, Data collections, Data processing, Sola
radiation, Pollutant identification.

Water quality parameters influence remotel
sensed spectral signatures. Regression analysi
was applied to the problem of measuring wate
quality parameters from remote sensing spectra
signature data. The equations necessary to per
form regression analysis and methods of testin
the strength and reliability of a regression ar
described. An efficient algorithm is given fo
selecting the optimal subset of the independen
variables available for a regression. To illustrat
the regression techniques, they were applied to
particular set of data from the Houston Ship Chan
nel. (Knapp-USGS)
W74-11230

EFFECT OF WASTE MANAGEMENT AND EGG PROCESSING ON THE FLAVOR OF COOKED EGGS,
Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
For primary bibliographic entry see Field 5C.
W74-11236

QUALITY OF BERLIN SURFACE WATERS MEASURING SCHEME, (DAS GUTEMESS PROGRAMM DER BERLINER OBERFLACHENGEWASSER),
H. Frenzel, and F. Sarfert.
Umwelthygiene, Vol 25, No 5, p 97-99, 1974. 1 fig 2 ref.

Descriptors: *Water quality, *Surface water, *Measurement, *Data processing, Monitoring, Automation, *Pollution identification.
Identifiers: Physical parameters, Chemical parameters, Bacteriological parameters, *Biological parameters, *Radiological parameters, *Berlin(Germany).

A scheme to measure the quality of Berlin surface waters has been extended to 98 sampling points. The program includes the examination of physical/chemical, bacteriological, biological, and partly, radiological parameters. It was necessary to make arrangements between the particupating laboratories as to the methods of analysis to be used. The resulting data will be subject to automatic data processing. (Shaffer-FIRL)
W74-11252

HOW TO MEASURE AMBIENT POLLUTION,
Philips Gloeilampenfabrieken, Eindhoven (Netherlands).
S. M. de Veer.
La Tribune du Cebedeau, Vol 27, No 364, p 129-133, March, 1974. 5 fig, 6 ref.

Descriptors: *Monitoring, *Remote sensing, *Data transmission, Costs, Water pollution, Water quality measurement, Air pollution, Automation, *Pollutant identification.
Identifiers: Netherlands, Field measurement.

The best way to measure ambient pollution quite often depends on the reason why one wishes to measure it. Efficient control is only possible if the feedback control loop 'process-measurement-control' is closed and all three segments are working optimally. For adequate pollution control continuous measurement is required. Field monitoring is usually done without an operator or data processor on hand. Extra reliability of the monitoring equipment is therefore essential. Automatic calibration, representative sampling, proof against environmental influences, and automatic data transmission are necessities of remote monitoring. Examples are given of the development of monitors for air and water pollution meeting the above requirements. The application and costs of monitoring are discussed. (Shaffer-FIRL)
W74-11255

COUGHING FISH MAY MONITOR WATER QUALITY.
Chemical and Engineering News, Vol 52, No 20, p 34, May 20, 1974.

Descriptors: *Fish, *Water quality, *Monitoring, Bioassay, Mervury, Copper, *Bioindicators, Pollutant identification.

The tendency of some species of fish to 'cough' (or make a similar sound) may be useful in monitoring water quality in lakes and streams. Tests have shown that concentrations of copper and mercury that inhibit growth and reproduction also cause an increase in the frequency of coughing. The coughing is a normal process that clears the gills of debris. Fish known to exhibit this behavior include bluegill, sunfish, fathead minnows, and all trout and salmon. Testing is underway on ten heavy metals and pesticides to see if, indeed, this type of bioassay would be reliable. (Shaffer-FIRL)
W74-11257

WATER AND EFFLUENT INSTRUMENTATION MADE SIMPLE,
Taylor Instrument Companies, Rochester, N.Y.
C. Maddinson.
Water Services, Vol 78, No 938, p 116-117, April 1974. 5 fig.

Descriptors: *Sewage treatment, *Instrumentation, *Flow measurement, *Water pollution control, Application methods, Effluents, Pressure, Waste water treatment, *Pollutant identification.
Identifiers: Magnetic flow meter, United Kingdom.

A considerable amount of money will be spent in England during the next few years on sewage treatment representing a growth for the instrument industry, though instrumentation represents but a small percentage of the expenditures anticipated. Discussed are various sewage flow measurement techniques such as level, differential pressure, and venturi measurements or the use of a magnetic flow meter. Also mentioned are pollution control devices and applications to pumping and speed control. (Sandoski-FIRL)
W74-11258

THE SOLVENT EXTRACTION ATOMIC ABSORPTION ANALYSIS OF EFFLUENTS AND WATER,
Sussex River Authority (England).
A. Lloyd.
Water Pollution Control, Vol 73, No 2, p 224-229, 1974. 1 fig, 4 tab, 16 ref.

Descriptors: *Solvent extractions, *Spectrophotometry, *Analytical techniques, *Metals, Effluents, Effluent streams, *Pollutant identification.
Identifiers: *Ammonium pyrollidine dithiocarbamate/Methyl isobutyl ketone system, Wet oxidation, Atomic absorption spectrophotometry.

The application of solvent extraction atomic absorption spectrophotometry (AAS) to the analysis of effluents and stream samples provides a rapid and accurate means of determining a variety of metals at the microgram/liter level. The ammonium pyrollidine dithiocarbamate/methyl isobutyl ketone system, which uses simple AAS equipment, can be applied to an even wider range of metals including Ag, Hg, and As9. The most important step in the analysis is the extraction stage, and potential interferences are likely to be of a chemical nature involving a lowering of the extraction efficiency of the chelate. When wet oxidation is necessary or when the sample contains a diversity of metals at the mg/liter level, a double extraction is required. However, for relatively clean samples a single extraction is suitable. Standard addition offers the advantage of allowing a single extraction to be applied to a wide range of sample types. (Sandoski-FIRL)
W74-11260

A MODIFIED ION EXCHANGE TECHNIQUE FOR THE DETERMINATION OF STABILITY CONSTANTS OF METAL-SOIL ORGANIC MATTER COMPLEXES,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
M. S. Ardakani, and F. J. Stevenson.
Soil Science Society of America Proceedings, Vol 36, No 6, p 884-890, November-December, 1972. 7 fig, 6 tab, 19 ref.

Descriptors: *Ion exchange, Humic acids, Humus, Chelation, *Analytical techniques, *Pollutant identification, *Organic matter, Soils.

Calculation methods based on Schubert's ion-exchange equilibrium method were developed for determining stability constants of metal-soil organic matter complexes. The methods, which were free of certain assumptions and errors inherent in the ion-exchange technique as applied previously to soil organic matter, were verified using Mn (II)-citrate and Mn (II)-oxalate systems. Apparent stability constants (log K) of Zn (II)-humic acid complexes varied from 3.13 to 5.13 at pH 6.5. (Skogerboe-Colorado State)
W74-11262

DETERMINATION OF TOTAL PHOSPHOROUS IN SOILS: A RAPID PERCHLORIC ACID DIGESTION PROCEDURE,
Purdue Univ., Lafayette, Ind. Agricultural Experiment Station.
For primary bibliographic entry see Field 2G.
W74-11273

A NEW MEIOFAUNA SAMPLER FOR QUANTITATIVE SAMPLING IN SOFT BOTTOMS, (EIN NEUER 'MEIOFAUNASTECHER' ZUR QUANTITATIVEN PROBENNAHME IN WEICHBODEN),
Kiel Univ. (West Germany). Zoologisches Institut.
For primary bibliographic entry see Field 7B.
W74-11313

CONTINUOUS-FLOW BIOASSAYS WITH AQUATIC ORGANISMS: PROCEDURES AND APPLICATIONS,
National Water Quality Lab., Duluth, Minn.
W. A. Brungs.
Biological Methods for the Assessment of Water Quality, American Society for Testing and Materials, Special Technical Publication 528, p 117-126, 1973. 23 ref.

Descriptors: *Bioassay, *Continuous-flow, *Methodology, Water quality, Water pollution, Testing, Testing procedures, Analytical techniques, Quality control, Monitoring, Aquatic animals.
Identifiers: *Dilution water, Toxicology.

Several types of continuous-flow methodology for toxicity bioassay are evaluated, and the advantages and disadvantages of each are discussed. Fail-safe devices, measured concentrations and care are essential to obtaining the best bioassay data. (Katz)
W74-11326

THE OCCURRENCE OF SOME TRACE METALS IN COASTAL ORGANISMS WITH PARTICULAR REFERENCE TO THE SOLENT REGION,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-11332

THE UTILIZATION OF A SIMPLE EXPERIMENTAL DEVICE FOR STUDY OF WATER POLLUTION IN SITU: COMPARATIVE EFFECTS OF THREE ANTI-PETROLEUM EMULSIFYING AGENTS,
Museum National d'Histoire Naturelle, Paris (France). Laboratoire de Physiologie Generale et Comparee.
For primary bibliographic entry see Field 5C.
W74-11334

BIODEGRADATION OF MIREX BY SEWAGE SLUDGE ORGANISMS,
Florida Univ., Gainesville. Pesticide Research Lab.
For primary bibliographic entry see Field 5B.
W74-11345

DETERMINATION OF LEAD USING CHARGED PARTICLE ACTIVATION ANALYSIS,
Texas A and M Univ., College Station. Dept. of Chemistry.
D. C. Riddle, and E. A. Schweikert.
Analytical Chemistry, Vol 46, No 3, p 395-398, March, 1974. 1 fig, 6 tab, 22 ref.

Descriptors: *Lead, *Analytical procedures, Tracers, Radioisotopes, Trace elements, Distribution, *Pollutant identification.
Identifiers: *Activation analysis(Charged particle).

Investigations are reported of charged particle activation applied to the trace lead and lead isotope ratio analysis using proton, deuteron, and He-3 activation. Trace analysis methods were studied using the following nuclear reactions: Pb-206, 207 (p, xn)Bi-206, Pb-206, 207 (d, xn) Bi-206, Pb-206, 207, 208 (He-3, xn) Po-207, and Pb-206, 207 (alpha, xn) Po 207. In addition, a rapid, nondestructive technique based on the reaction Pb-206 (d, p) Pb-207m (t 1/2 = 800 msec) was evaluated and proton and deuteron activation were further examined for measuring Pb-204/Pb-206 ratios. Activation curves were determined for the reactions investigated and results of destructive and nondestructive determinations are presented. The detection limits were estimated at 0.01 ppm for proton and deuteron activation and at 0.1 and 0.2 ppm for He-3 and He-4 activation respectively. (Jernigan-Vanderbilt)
W74-11349

POTENTIOMETRIC MEASUREMENT OF COPPER IN SEAWATER WITH ION 1 = 1 SELECTIVE ELECTRODES,
Texas Instruments, Inc., Dallas.
R. Jasinski, I. Trachtenberg, and D. Andrychuk.
Analytical Chemistry, Vol 46, No 3, p 364-369, March, 1974. 6 fig, 4 tab, 18 ref.

Descriptors: *Copper, *Seawater, *Analytical techniques, *Potentiometers, Inorganic compounds, Organic compounds, On-site data collections, Electrochemistry, *Pollutant identification.

The data reported confirm that, with proper precautions in sample handling and measurement, the ionic cupric copper concentration of seawater can be monitored with ion-selective electrodes. The measured cupric ion content is identical to the total soluble cupric copper content when the electrode response is calibrated directly in seawater, to account for the inorganic complex ion distribution; when organic chelating agents with high stability constants relative to cupric ion are absent; and when the proper Nernstian slope is used in calculation. At and below 1 ppb copper, account must be taken of the injection of soluble copper (or silver) into solution by the sensor electrode. Seawater samples from three different sources were studied. The analysis of an open ocean water was straightforward. However, analysis of the near shore waters showed abnormalities which can be explained by the presence of small quantities of chelating agents. (Jernigan-Vanderbilt)
W74-11350

SPECTROCHEMICAL METHOD FOR THE DETERMINATION OF 36 ELEMENTS IN INDUSTRIAL EFFLUENT,
Engelhard Industries, East Newark, N.J. Instrumental Analysis Lab.
V. M. LeRoy, and A. J. Lincoln.
Analytical Chemistry, Vol 46, No 3, p 369-373, March, 1974. 6 tab, 1 fig, 20 ref.

Descriptors: *Trace elements, *Analytical techniques, *Spectroscopy, *Industrial wastes, Chemistry, Pollutants, Sampling, Standards, Testing procedures, Iron, Tin, Nickel, Manganese, Chromium, Copper, Zinc, Aluminum, Silver, Gold, Molybdenum, Lead, Cadmium, Calcium, Magnesium, Mercury, Cobalt, *Pollutant identification.

A quantitative spectrochemical method is described for the determination of 36 elements in industrial effluent with limits of element sensitivities for the analytical curves in the 0.0005-0.1 mg/100 ml range. One set of analytical curves was used for all samples. The samples were weighed salt residues obtained through evaporation to dryness at 120C. Any sample volume can be used. Matrix effects were significantly reduced by combining total energy burns in an argon-oxygen atmosphere with 1:6 salt to high purity graphite powder dilutions. Germanium dioxide, added to the graphite powder was the internal standard. Conditions of analysis, salt weight ratios, preparation of standards, precision, and accuracy are discussed. (Jernigan-Vanderbilt)
W74-11351

THE VANADIUM AND SELECTED METAL CONTENTS OF SOME ASCIDIANS,
California Univ., Davis. Dept. of Chemistry.
J. H. Swinehart, W. R. Biggs, D. J. Halko, and N. C. Schroeder.
Biological Bulletin, Vol 46, p 302-312, April, 1974. 2 fig, 1 tab. ACS(PRF-6686-AC3).

Descriptors: *Heavy metals, *Aquatic life, *Seawater, Analytical techniques, Spectroscopy, Testing procedures, Iron, *California, Pollutant identification.
Identifiers: *Vanadium, *Ascidians.

The vanadium and other selected transition metal contents of ascidians primarily from the northern California coast are reported. It has been suggested that the ability to concentrate vanadium to levels greater than the combined levels of other transition metals is confined to certain families in the order Phlebobranchia, but several workers have reported finding substantial concentrations of vanadium in species from the order Aplousobranchia. Studies were carried out on certain species of these orders to determine vanadium content. Observations were made on a species from the order of Stolidobranchia to determine iron content. The species Ascidia ceratodes and Perophora annectens had large vanadium contents as has been predicted for members of the families Ascidiidae and Perophoridae from the order Phlebobranchia. Several species in the order Aplousobranchia have large vanadium contents: the vanadium being present as vanadium (IV) whereas it is vanadium (III) that is found in order Phlebobranchia. Molgula manhattensis, a species from the order Stolidobranchia, shows a large iron content: the metal being localized in the fluid from the heart. Three dominant fractions were chromatographed from the cells contained in the fluid of Ascidia ceratodes. The spectra of these fractions were correlated with the spectrum of the cells. (Jernigan-Vanderbilt)
W74-11353

TRACE METAL ANALYSIS IN WATER BY PROTON-INDUCED X-RAY EMISSION ANALYSIS OF ION-EXCHANGE MEMBRANES,
Duke Univ., Durham, N.C. Paul M. Gross Chemical Lab.
C. H. Lochmuller, J. W. Galbraith, and R. L. Walter.
Analytical Chemistry, Vol 46, No 3, p 440-442, March, 1974. 6 fig, 1 tab, 11 ref.

Descriptors: *Trace elements, *Analytical techniques, *Sampling, Water, X-rays, Ion-exchange, Spectroscopy, Testing procedures, Lead, Mercury, Cadmium, *Pollutant identification.
Identifiers: *X-ray emission analysis.

A simple technique has been developed which provides a rapid, semiquantitative screening method for most metals found in water systems without laborious and exacting preconcentration and chemical techniques. The method involves the use of proton-induced X-ray emission analysis. A target to be analyzed is placed in the path of a beam of protons produced by an accelerator. The atoms of the target are thus excited and emit characteristic X-rays which are captured by a solid state detector. A pulse-height analyzer is used to count the X-rays and an energy spectrum is obtained. Advantages over conventional X-ray fluorescence spectroscopy include lack of interference from bremsstrahlung or 'white radiation' and larger X-ray production cross section. Metals are absorbed by an ion exchange membrane, saving time ordinarily needed to evaporate large volume samples. Prepared solutions, tap water, river water and milk were tested. (Jernigan-Vanderbilt)
W74-11355

DETERMINATION OF TOTAL MERCURY IN AIR BY CHARCOAL ADSORPTION AND ULTRAVIOLET SPECTROPHOTOMETRY,
National Environmental Research Center, Research Triangle Park, N.C. Quality Assurance and Environmental Monitoring Lab.
F. P. Scaringelli, J. C. Puzak, B. I. Bennett, and R. L. Denny.
Analytical Chemistry, Vol 46, No 2, p 278-283, February, 1974. 8 fig, 5 tab, 18 ref.

Descriptors: *Mercury, *Air pollution, *Analytical techniques, Spectroscopy, Sampling, Silver, Inorganic compounds, Activated carbon, *Spectrophotometry, *Pollutant identification.

A simple inexpensive method is described for determining concentrations of total mercury in the atmosphere. Mercury and its compounds were effectively collected by passing ambient air through activated charcoal contained in Vycor tubes. The charcoal tubes were prepared by heating under nitrogen to activate the charcoal and to remove impurities. Immediately after cleaning, the tubes were sealed with ball joints until ready for sample collection to prevent contamination. After sampling, the tubes were resealed for transport to the laboratory where they became an integral part of the analytical gas train. The mercury and its compounds were vaporized by heating under a stream of nitrogen and carried to a thermal reactor, which converted the compounds to the elemental state. Elemental mercury then amalgamated on silver, allowing potential interferences to pass through the absorption cell. The silver amalgam was heated to 300C to give absorption peaks in the ultraviolet at 253.7 nm that were sharp and reproducible. The method was tested with simulated and real atmospheres under field conditions. Precision and accuracy of the method was greater than 95% within the range of 0.15 to 1.5 micrograms/cu m. Outside this range, the error would be greater; however, the dynamic range may be shifted upward or downward by changing sampling rates, sample times, or cell path and by combination of these variables. (Jernigan-Vanderbilt)
W74-11363

APPLICATION OF CHELATING ION EXCHANGE RESINS FOR TRACE ELEMENT ANALYSIS OF GEOLOGICAL SAMPLES USING X-RAY FLUORESCENCE,
Georgia Univ., Athens. Dept. of Geology.
C. W. Blount, D. E. Leyden, T. L. Thomas, and S. M. Guill.
Analytical Chemistry, Vol 45, No 7, p 1045-1050, June, 1973. 2 fig, 3 tab, 20 ref. NSF GP-24311.

Descriptors: *Trace elements, *Resins, *X-ray fluorescence, *Separation techniques, Analytical techniques, *Chelation, *Ion exchange, *Pollutant identification.

The use of chelating ion exchange resins for the quantitative batch extraction of ions of trace elements and as a matrix for the determination of the elements using X-ray fluorescence is described. Chelex-100, an ion exchange resin containing iminodiacetic acid functional groups, was used for the determination of cobalt and nickel in U.S. Geological Survey samples. The selective extraction of bismuth was achieved by pH control, and bismuth was determined in several geochemical standard samples, NMRR, a chelating resin highly selective for gold and platinum metals, was used for the specific extraction of gold. In all cases, the determination was performed by pressing the resin into pellets and using these pellets as samples for X-ray fluorescence. Samples containing as little as 0.04 ppm gold, 0.2 ppm bismuth, and 15 ppm cobalt or nickel were analyzed. (Jernigan-Vanderbilt)
W74-11364

SOLVENT EXTRACTION FOR THE SEPARATION OF METALS,
Rutgers The State Univ., New Brunswick, N. J.
S. A. Katz.
American Laboratory, p 19, 10, 22, 23, October, 1972. 1 tab, 19 ref.

Descriptors: *Separation techniques, *Solvent extractions, *Analytical techniques, *Trace elements, Heavy metals, Testing procedures, Aqueous solutions, Thermodynamics, *Pollutant identification.
Identifiers: Metal ions.

Solvent extraction provides a rapid and conventional approach to the separation and isolation of metal ions from complex mixtures. Prior to separation and subsequent quantitative determinations, the sample containing the metal ions is most frequently encountered as an aqueous solution, therefore, it should be understood that solvent extraction implies the presence of an aqueous solvent/organic solvent pair. In extraction systems, some or all of the water molecules coordinated to the metal ion must be removed before it is possible to obtain a species that can be extracted into an organic solvent. There appear to be three aspects common to all extraction procedures: (1) the formation of an extractable species, (2) the distribution of the extractable species between the initial aqueous phase and the extracting organic phase, and (3) interactions of the extracted species in the organic phase. The formation of an uncharged species is probably a prerequisite for the extraction of metal ions into organic solvents. Such species may be formed by metal-containing ions through coordination. In addition, an uncharged, extractable species may be achieved through the neutralization of a charge. (Jernigan-Vanderbilt)
W74-11365

THE DETERMINATION OF TRACE QUANTITIES OF MOLYBDENUM BY ATOMIC ABSORPTION SPECTROSCOPY,
National Physical Research Lab., Pretoria (South Africa).
L. R. P. Butler, and P. M. Mathews.
Analytica Chimica Acta, Vol 36, p 319-327, 1966. 3 fig, 8 tab, 10 ref.

Descriptors: *Molybdenum, *Spectroscopy, Analytical techniques, Testing procedures, Laboratory tests, Trace elements, Springs, Rivers, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy.

A procedure is described for the determination of trace quantities of molybdenum by atomic absorption spectroscopy. Molybdenum was complexed with ammonium pyrollidine dithiocarbamate or 8-hydroxyquinoline and extracted into n-amylmethyl ketone. Molybdenum was then determined by atomic absorption spectroscopy. Interferences were eliminated and detection limits of 0.002ppm for water samples, 0.1ppm for samples of dried plant material, and 1.0ppm for silicate rock samples were obtained. The limit of detection for both the dried plant material and the rock samples could have been improved by increasing the initial weight sample. The methods developed appear to be satisfactory from the point of view of accuracy and precision. Although the chemical steps are time-consuming, many samples can be analyzed daily. The method appears to be at least as rapid and accurate as any other method in use. (Jernigan-Vanderbilt)
W74-11371

INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS OF LEAD MATRICES FOR MERCURY,
California Univ., Irvine.
W. P. Guinn, and K. Heydorn.
Transactions of the American Nuclear Society, Vol 15, p 70, 1972. 2 ref.

Descriptors: *Mercury, *Lead, *Neutron activation analysis, Analytical techniques, Pollutant identification.
Identifiers: *Interferences.

When specimens of various kinds of materials are analyzed for mercury by neutron activation analysis, for all but extremely long irradiations, the sensitivity attainable via the Hg 197-induced activity is appreciably better than that attainable via the Hg 203-induced activity. Because of the low energies of the Hg 197 emissions, workers using NaI (T1) gamma-ray spectrometry have usually preferred to utilize the higher energy gamma-ray (279.1 KeV) of Hg 203. Now, with the wide availability of large high-resolution Ge(Li)detectors, it is generally preferable to measure the Hg 197 activity instead. Use of the Hg 203 activity in the analysis of lead-rich matrices can lead to erroneous results due to the emission of photons of the same energy by Pb 203 and by Hg 203. An example of misidentification is the case of measuring the mercury content in automobile exhaust solids when it was apparently actually lead that was being measured. The difference in half lives of Pb 203 and Hg 203 activity allows differentiation of the elements even with an NaI (T1) detector. (Jernigan-Vanderbilt)
W74-11373

ION-EXCHANGE PAPER CHROMATOGRAPHY OF METAL IONS WITH MIXED AQUEOUS-ORGANIC SOLVENTS CONTAINING MINERAL ACID AND A SELECTIVE EXTRACTANT,
Lafayette Coll., Easton, Pa. Dept. of Chemistry.
J. Sherma, and F. J. VanLenten.
Separation Science, Vol 6, No 2, p 199-206, April, 1971. 17 ref.

Descriptors: *Chromatography, *Ion exchange, Aqueous solutions, *Metals, *Solvent extractions, Analytical techniques, Separation techniques, Chemical reactions, Organic compounds, Scandium, Nickel, Cations, Anions, Laboratory tests, *Pollutant identification.
Identifiers: *Metal ions.

An ion exchange chromatography method has been used for numerous useful separations. The results of ion-exchange with papers are often the same as those achieved with column systems employing the same mobile phase and a similar resin. Mixed solvents containing an organic extractant provide selective separations of metal ions on cation-and anion-exchange papers. The separations of scandium, hafnium plus zirconium, nickel and thorium from complex mixtures has been demonstrated. Various separations in dithizone and dimethyl sulfoxide media are also reported. As a general rule, ions with very high distribution coefficients (greater than 1000) will remain at the origin during paper chromatography, while ions with coefficients below 1 will migrate. (Jerome-Vanderbilt)
W74-11374

LEAD-POISONING DETECTOR.
HSMHA Health Reports, Vol 86, No 7, p 652, July, 1971. 1 photo.

Descriptors: *Lead, *Analytical techniques, *Public health, *Instrumentation, Pollutants, Metals, Enzymes, Testing procedures, Toxins, On-site data collections, *Pollutant identification.

An ultra-sensitive, portable instrument for detecting lead poisoning in people, called the microporph, has been developed. The portable unit can be operated on house current by personnel with minimum training and requires only 30-40 microliters of blood for analysis. The test is for protoporphyrin rather than lead itself. The instrument can easily handle two tests per minute and is sufficiently sensitive to detect normal as well as abnormal protoporphyrin levels in the blood. Thus, any degree of lead poisoning may be detected. (Jerome-Vanderbilt)
W74-11377

MERCURY DETERMINATIONS IN NATURAL WATERS BY PERSULFATE OXIDATION,
Georgia Univ., Athens. Dept. of Zoology.
J. J. Alberts, J. F. Schindler, R. W. Miller, and P. W. Carr.
Analytical Chemistry, Vol 46, No 3, p 434-437, March, 1974. 3 fig, 2 tab, 9 ref.

Descriptors: *Mercury, *Aqueous solutions, *Analytical procedures, *Reduction(Chemical), Oxidation, Organic compounds, Testing procedures, Instrumentation, Sampling, *Pollutant identification, Sampling.
Identifiers: Sample preparation, *Atomic absorption spectroscopy.

A procedure is described for determining mercury at the parts-per-billion (ppb) level in aqueous solution which uses an open analysis system, requires small sample volume, is easily handled in the field and during transportation, has little loss of mercury during storage, allows oxidation at elevated temperatures, has improved analysis time, and ensures that the sample is sealed until opened in the analysis system, thereby releasing all of the mercury present as the metallic vapor. The method is an adaptation of the Menzel and Vaccaro ampoule method for determination of dissolved organic matter in natural waters, involving the oxidation of organic matter by persulfate in an ampoule sealed under nitrogen and heated to 120C. (Jernigan-Vanderbilt)
W74-11378

MERCURY CONTENT IN FEATHERS OF SWEDISH BIRDS FROM THE PAST 100 YEARS,
Museum of Natural History, Stockholm (Sweden).
W. Berg, A. Johnels, B. Sjostrand, and T. Westermark.
Oikos, Vol 17, No 1, p 71-83, 1966, 12 fig, 12 tab, 17 ref.

Descriptors: *Path of pollutants, *Birds, *Mercury, *Food chain, Water pollution, Pollutants, Temporal distribution, Analytical techniques, *Neutron activation analysis, Measurements, Sampling, Data collections, Evaluation, Laboratory tests, *Pollutant identification.

The mercury content in feathers in ten species of birds was determined by activation analysis. Using material drawn from skins and mounted specimens and from living or freshly killed birds, the study covered a period of more than the past hundred years. The possibility of post mortem contamination is discussed and allowances have been made for such cases. Roughly constant Hg levels were encountered in each of the investigated species during the period 1840-1940, although there was considerable variation between species. Differences in position within the food chain seem to account for such differences between species. A well documented increase of Hg concentration, amounting to a least 10 to 20 times the previous level appeared in specimens from the 1940's and 1950's. This appearance of increased mercury accumulations in birds mainly in the early 1940's indicates that alkyl-Hg compounds used as seed dressings were chiefly responsible for the increase. (Jerome-Vanderbilt)
W74-11382

DETERMINATION OF LEAD, URANIUM, THORIUM, AND THALLIUM IN SILICATE GLASS STANDARD MATERIALS BY ISOTOPE DILUTION MASS SPECTROMETRY,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
I. L. Barnes, E. L. Garner, J. W. Gramlich, L. J. Moore, and T. J. Murphy.

Analytical Chemistry, Vol 45, No 6, p 880-885, May, 1973. 1 tab, 4 fig, 11 ref.

Descriptors: *Mass spectrometry, Isotope studies, *Lead, Analytical techniques, *Silicates, Standards, Materials testing, *Pollutant identification.
Identifiers: *Thorium, *Thallium, *Uranium.

One of the first materials to be selected for standard materials for trace element analysis was a silicate matrix containing many elements at a series of graded concentration levels. These were prepared by the Corning Glass Works. A set of four standard glass wafers were prepared which had been doped with 61 different elements at the 500, 50, 1, and 0.02ppm level. The concentrations of lead, uranium, thorium, and thallium were determined by isotope dilution mass spectrometry at a number of points in each of the glasses. The results obtained from independent determinations in two laboratories demonstrated the homegeneity of the samples and that precision of the order of 0.5% (95% L.E.) may be obtained by the method even at the 20ppb level, for these elements. The chemical and mass spectrometric procedures are presented. (Jernigan-Vanderbilt)
W74-11385

DETERMINATION OF SUBMICROGRAM AMOUNTS OF MERCURY BY THE OXYGEN BOMB COMBUSTION METHOD,
National Environmental Research Center, Las Vegas, Nev.
E. W. Bretthauer, A. A. Moghissi, S. S. Snyder, and N. W. Mathews.
Analytical Chemistry, Vol 46, No 3, p 445-446, March 1974. 2 tab, 4 fig.

Descriptors: *Mercury, *Analytical techniques, *Burning, Tracers, Inorganic compounds, Organic compounds, Spectrocopy, Testing procedures, Instrumentation, Organic matter, Radioisotopes, *Pollutant identification.
Identifiers: *Methylmercury, Sample preparation, *Atomic absorption spectroscopy.

Using flameless atomic absorption, oxidation of the sample containing inorganic and/or organic mercury was conducted in an oxygen-filled bomb. Using this technique and utilizing a radiotracer of mercury to quantitate any losses during the oxidation, an accurate method was developed to determine environmental levels of mercury in combustible samples. The method was tested by determining the recovery of both stable and radioactive mercury, added in either an organic or inorganic form from vegetation samples. Mercuric chloride and organic mercury were added to alfalfa samples, resulting in recoveries from 78 to 90%. If the amount of organic mercury is desired distinct from the total mercury content, a separation of organic from inorganic fractions should be performed before combustion in the bomb. (Jernigan-Vanderbilt University)
W74-11388

TRACE DETERMINATION OF BERYLLIUM OXIDE IN BIOLOGICAL SAMPLES BY ELECTRON-CAPTURE GAS CHROMATOGRAPHY,
Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio.
G. M. Frame, R. E. Ford, W. G. Scribner, and T. Ctvrtnicek.
Analytical Chemistry, Vol 46, No 4, p 534-539, April, 1974. 4 tab, 14 ref.

Descriptors: *Beryllium, *Oxides, *Organic matter, *Gas chromatography, Analytical techniques, Laboratory tests, Testing procedures, Animal physiology, Rodents, Mammals, Pollutant identification.

Two preparations of beryllium oxide labeled with Be7 were synthesized by calcining at 500 or 1600C. Comparative radiochemical and gas chromatographic analyses of these oxides were made using two procedures. Direct dissolution-chelation of the oxides with concentrated trifluoroacetylacetone in ampoules followed by electron-capture gas chromatography of the resultant beryllium chelate suffered from interference by a trifluoroacetylacetone reaction product. A second method employed the dissolution of the oxides in dog blood and rat liver homogenate media by a hot 75% sodium hydroxide procedure. The beryllium from the dissolved oxide was then chelated by a low temperature reaction with trifluoroacetylacetone without forming an interfering product. Subsequent gas chromatographic analysis yielded recoveries averaging 105%; standard deviation= plus or minus 7%. The samples tested were limited to the 1.0mg Be0/ml level by radioactivity, but the gas chromatographic base-line noise level was now enough to permit analyses of submicrogram quantities. (Jernigan-Vanderbilt)
W74-11389

ANALYSIS OF ORGANIC MERCURY COMPOUNDS BY GAS CHROMATOGRAPHY,
Kobe Univ. (Japan). Dept. of Public Health.
K. Sumino.
Kobe Journal of Medical Science, Vol 14, p 115-148, June, 1968, 12 fig, 14 tab, 19 ref.

Descriptors: *Mercury, *Analytical techniques, *Gas chromatography, *Separation techniques, *Water pollution sources, Metals, Heavy metals, Pesticides, Human pathology, Calibrations, *Pollutant identification.
Identifiers: *Extraction, *Isolation, *Methylmercury.

Ultratrace determinations of alkyl and phenyl mercury using a gas chromatograph with an electron capture detector have been performed. A detection limit for methyl mercury chloride of 10 to the-12 th power and for phenyl mercury chloride of 10 to the -11th power was reached. Isolation of organic mercury from different materials was performed by separation of organic mercury combined with SH radical into 1N-HC1 solution. The solution was then extracted with benzene, and this benzene solution re-extracted with aqueous glutathione. After acidification of the resulting solution with HC1, final extraction with benzene was performed. This cleanup method was employed in the identification of organic mercury and was a very useful technique for its extraction. Materials related to Minamata Disease were analyzed and found to contain high concentrations of methylmercury. An attempt to trace Minamata Disease in Niigata Prefecture led to the following conclusions: (1) Methylmercury was detected in water moss only in the area around a drainage outlet of an acetaldehyde factor; (2) Methylmercury is a by-product in acetaldehyde production; (3) Waste discharge from the factory caused Minamata Disease in experimental animals. (Oleszkiewicz-Vanderbilt)
W74-11390

DESIGN AND EVALUATION OF A VIDICON SCANNING SPECTROMETER FOR MOLECULAR ABSORPTION AND ATOMIC EMISSION SPECTROMETRY,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
M. J. Milano, H. L. Pardue, T. E. Cook, R. E. Santini, and D. W. Margerum.
Analytical Chemistry, Vol 46, No 3, p 374-381, March, 1974 8 fig, 2 tab, 13 ref. AFOSR(71-1588) and PHS(GM 13326-07).

Descriptors: *Measurement, *Spectroscopy, *Analytical techniques, *Instrumentation, *Metals, Testing procedures, Calcium, Iron, Copper, Salts, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy.

A silicon target vidicon tube is used for scanning spectrometry in the visible region at speeds ranging from less than 0.1Hz up to 250Hz. The spectrometer is interfaced to a digital computer for on-line collection and processing of data. Dynamic range data taken over four orders of magnitude yield a gamma function of 0.998 plus or minus 0.005 for the tube. Quantitative data are reported for kinetic studies using molecular absorption spectrometry and simultaneous multielement analyses in synthetic solutions using flame emission spectrometry. Chemical data included demonstrate that absorbance data are reliable to at least 0.002 absorbance unit at a scan rate of 250Hz. Flame emission data are linear between 0.25 and 10ppm for sodium, potassium and lithium and between 1 and 100ppm for calcium. Standard deviations for repetitive runs on the alkali metals range from a low of 0.01ppm for 0.25ppm lithium to a high of 0.12ppm for 10ppm sodium. (Jernigan-Vanderbilt)
W74-11394

FILTER PORE-SIZE EFFECTS ON THE ANALYSIS OF AL, FE, MN, AND TI IN WATER,
Geological Survey, Menlo Park, Calif.
V. C. Kennedy, and G. W. Zellweger.
Water Resources Research, Vol 10, No 4, p 785-790, August 1974. 1 fig, 2 tab, 24 ref.

Descriptors: *Water analysis, *Filtration, *Clay minerals, *Analytical techniques, Separation techniques, Spectroscopy, *Aluminum, *Iron, *Titanium, *Manganese, Adsorption, Particle size, Clays, Pollutant identification.

Fine-grained particulate material can pass through 0.45-micrometer membrane filters and cause large percentage errors in analyses of those elements that are enriched in the particulates and have a very low concentration in solution in natural waters; Al, Fe, Ti, and, to a lesser extent, Mn are examples. Hence in making thermodynamic equilibrium calculations for these elements, considerable caution is necessary in using analyses from water samples passed through filters with pore sizes larger than 0.1 micrometer. Compared with 0.45 micrometer filters the 0.1 micrometer filters significantly reduce passage of particulates without increasing filtration time to an unreasonable degree. If the common procedure of filtration through a membrane filter followed by acidification is used, the concentration of dissolved Al, Fe, and Mn determined in the filtrate will vary with the degree of filter clogging, pH after acidification, and the time of standing before analysis. When a spectrographic analysis of a water residue, which can be quite sensitive for Ti, is made, the presence of Ti concentrations significantly exceeding 1 microgram per liter should be a warning that clay minerals may have passed through the filter. (Knapp-USGS)
W74-11421

COMPARISON OF OBSERVED AND CALCULATED CONCENTRATIONS OF DISSOLVED AL AND FE IN STREAM WATER,
Geological Survey, Reston, Va.
B. F. Jones, V. C. Kennedy, and G. W. Zellweger.
Water Resources Research, Vol 10, No 4, p 791-793, August 1974. 3 tab, 26 ref.

Descriptors: *Water chemistry, *Water analysis, *Chelation, *Organic matter, *California, Analytical techniques, Aluminum, Iron, Mineralogy, Equilibrium, Leaching, Weathering, *Pollutant identification.

Measured concentrations of dissolved Al and Fe in streamflow samples treated to avoid particulate contamination can compare favorably with concentrations calculated from data on mineral stability and inorganic complexing. Significant differences are probably related to storm runoff or organic complexing. Waters from several northern California streams, analyzed in conjunction with special techniques to exclude particulate contamination, contained dissolved Al and Fe in the ranges 1-3 and 0.3-8.8 micrograms/l respectively,

for samples collected during low-flow periods. A moderate flow sample from the Mattole River, in an area of 90-100in of rainfall per year, gave an Al concentration of 10 micrograms/l and an Fe concentration of about 0.3 microgram/l. Comparison of these concentrations for dissolved Al and Fe with those calculated from stability constants for common mineral phases with provision for inorganic complexing shows them to be generally in reasonable agreement. Higher than expected values of Al were associated with storm runoff, and abnormally high Fe was found in streams with highly organic sediment. (Knapp-USGS)
W74-11422

DETERMINATION OF TRACE METALS IN SODIUM DITHIONITE-CITRATE EXTRACTS OF SOILS AND SEDIMENTS BY ATOMIC ABSORPTION,
Geological Survey, Menlo Park, Calif. Water Resources Div.
E. A. Jenne, J. W. Ball, and C. Simpson.
Journal of Environmental Quality, Vol 3, No 3, p 281-287, July-September 1974. 2 fig, 4 tab, 32 ref.

Descriptors: *Trace elements, *Soils, *Sediments, *Chemical analysis, *Flame photometry, Solvent extractions, Analytical techniques, Cobalt, Copper, Nickel, Molybdenum, Zinc, Iron, Trace elements, *Pollutant identification.
Identifiers: *Atomic absorption photometry.

A general method was developed for the analysis of Co, Cu, Ni, Mo, and Zn in dithionite-citrate extracts of soils and sediments. Because of the high Zn content of dithionite, it is necessary to preclean the dithionite-citrate solution before it is used to extract soils or sediments. This precleaning lowers the detection level significantly for other trace elements as well. Since Fe causes flame interferences in atomic absorption, the size of the individual sample aliquot taken to chelation-solvent concentration is varied to provide a constant quantity of Fe (5ng). The standards and blanks are adjusted to the same Fe content. This approach is necessitated by the wide differences in the Fe concentrations of the dithionite-citrate extracts. Following pH adjustments and addition of ammonium-1-pyrrolidine dithiocarbamate, the trace metals (and Fe) are concentrated via two successive 10ml methyl isobutyl ketone extractions. Quantities of Fe much greater than 5ng interfere in the solvent concentration step. Natural organics released by the dissolution of free-Fe and -Mn oxides, to the extent that they are represented by fulvic acids, do not cause any significant interference. (Knapp-USGS)
W74-11425

A STUDY OF OIL SOURCE IDENTIFICATION TECHNIQUES,
Coast Guard, Washington, D.C. Office of Research and Development.
L. Melamed.
Available from NTIS, Springfield, Va., 22161 as AD-761 971, Price $4.50 printed copy; $2.25 microfiche. Environmental and Transportation Technology Division Report, September 1972. 59 p, 7 fig, 1 tab, 25 ref, append.

Descriptors: *Oil pollution, *Oil spills, *Pollutant identification, Path of pollutants, Tracking techniques, Tagging, Marking techniques, Tracers.

Techniques for the identification of the sources of oil slicks include both passive (fingerprint) and active tagging. Passive techniques are easy to implement but offer a fragile forensic foundation; conversely, active techniques can provide excellent courtroom evidence but are beset by problems of system implementation. Active tagging is recommended for research. Organic phosphors and halogenated polycyclic aromatics are possible tags for field use. (Knapp-USGS)
W74-11435

THE DETERMINATION OF MERCURY IN COMMERCIALLY IMPORTANT AQUATIC ORGANISMS,
Omni Research, Inc., Mayaguez, Puerto Rico. Caribbean Research Labs.
R. Y. Ting.
Available from NTIS, Springfield, Va., 22161 as COM-73-11125, Price $4.25 printed copy; $2.25 microfiche. Project Completion Report to NOAA, National Marine Fisheries Service, October 1972. 43 p, 1 fig, 3 tab, 5 ref.

Descriptors: *Mercury, *Fish, *Puerto Rico, Heavy metals, Poisons, Trace elements, Public health, *Pollutant identification.

Mercury in the flesh of the majority of fish and invertebrates commonly taken for consumption in Puerto Rico was below the maximum permissible level set by FDA (0.5ppm). However, the flesh of larger pelagic carnivorous fish including barracuda, blue marlin, and kingfish often exceeded the 0.5ppm level. Herbivorous fish, in general, contain less mercury than carnivorous fish of comparable weight. (Knapp-USGS)
W74-11438

MONITORING TOXAPHENE CONTAMINATION IN A GEORGIA ESTUARY,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 5B.
W74-11443

5B. Sources Of Pollution

LOCALIZED THERMAL POLLUTION IN SHALLOW STREAMS, (NEAR-FIELD TEMPERATURE DISTRIBUTIONS),
Kansas Univ., Lawrence. Water Resources Research Inst.
Y-S. Yu.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 632, $3.75 in paper copy, $2.25 in microfiche. Contribution No 133, September 1973. 53 p, 18 fig, 3 tab, 6 ref. OWRR A-040-KAN(1). 14-31-0001-3516.

Descriptors: *Thermal pollution, *Heated water, *Temperature distribution, Velocity, Water temperature, Dilution, Heat flow, Distribution patterns.
Identifiers: *Dilution factor, *Heat flow ratio, Shallow streams, *Thermal plumes, Heated discharge.

Temperature rise in the near field of a heated discharge into a relatively wide and shallow stream has been determined in a laboratory channel. The experimental results show that the region in which the maximum temperature rise in each section of the stream exceeds 5 degrees F, is limited to a distance no larger than 32 bo (bo = width of channel for the heated discharge) downstream from the entry of heated water. The maximum width of the thermal plume in this critical region is less than four-fifths of the width of the stream flow. The maximum temperature rise near the water surface decays linearly with the distance measured along the stream on a log-log plot. An empirical equation for the position of the axis of the thermal plume is obtained. The width of spread measured from the axis to the stream-side boundary of the thermal plume is proportional to the distance. The dilution factor and heat flow ratio at four different sections in the thermal plume have also been determined. The maximum heat loss in this region is less than 8% of the original heat flow in the heated water. The effects of the five key dimensionless parameters, namely, U/V, Th/Ta, Fo, dh/bo, and a on the dilution factor are discussed. The presence of a weir at the entry of the heated discharge results in an extended region of temperature inversion due to the spreading of heated water along the channel bottom. The results of this study can be used as a first approximation to estimate the size of thermal plume and the decay of maximum temperature rise in the near field in relatively shallow and wide stream.
W74-10902

AGRICULTURAL WASTE WATER ACCOMMODATION AND UTILIZATION BY VARIOUS FORAGES,
Maryland Univ., College Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-10903

WATER-BORNE TRANSMISSION OF CHLORAMPHENICOL-RESISTANT SALMONELLA TYPHI IN MEXICO,
Institute of Health and Tropical Diseases, Mexico City. Epidemiology Unit.
For primary bibliographic entry see Field 5C.
W74-10906

THE EFFECT OF HYDROMETEOROLOGICAL CONDITIONS ON THE ZETA-POTENTIAL OF SUSPENDED SOLIDS (HIDROMETEOROLOGIAI VISZONYOK HATASA A LEBEGO ANYAGOK ZETA-POTENCIALJARA),
L. Bulkai, I. Licsko, and L. Szepkuti.
Hidrologiai Kozlony, No 12, p 557-565, 1973. 6 fig, 4 tab, 2 ref. English summary.

Descriptors: *Zeta potential, *Suspended solids, Rivers, *Hydrometeorology, Electric properties, Conductivity, Water level, Seasonal, Temperature, Algae.
Identifiers: *Danube River, Electrostatic charges, River stages.

The effect of hydrometeorological conditions on the zeta potential of suspended solids was investigated in the Danube River. The colloidal particles had a negative charge and almost every particle within a sample had a different zeta potential. Therefore, it was impossible to describe a particular hydrometeorological situation positively and unambiguously by a single zeta potential value. An attempt was subsequently made to describe the electrostatic charges of the colloidal particles present by the distribution of the zeta potential values observed. The observation data were processed with the help of a computer, but there was no correlation between either the suspended solids content and zeta potential or between conductivity and zeta potential. There was a relationship of limited validity between the number of algae counted in unit volume and the value of the zeta potential. At an increasing alga count the zeta potential tended to zero, whereas decreasing counts were accompanied by increasing zeta potential values. A relationship of similarly limited, but more general validity was found to exist between river stage and the zeta potential. (Merritt-FIRL)
W74-10907

NOTE ON LITHIUM IN SALINE GROUNDWATERS,
Central Soil Salinity Research Inst., Karnal (India).
I. C. Gupta.
Indian J Agric Sci. Vol 42, No 7, p 650-651. 1972.
Identifiers: *Electrical conductivity, Groundwater, Irrigation, *Lithium, *Saline groundwater, Toxicity, *India(Uttar Pradesh).

Ground water samples from Mathura, Uttar Pradesh, India, were analyzed for Li. The irrigation waters were classified on the basis of electrical conductivity (micromhos/cm at 25 degrees C) as C1 (0-250); C2(250-750); C3 (750-2250); C4 (2250-4000); C5 (4000-6000) and C6 (> 6000). Out of 35 samples 6 belonged to C3 class, 3 to C4 class, 9 to C5 and the rest to C6 class. All waters contained Li, the lowest concentration being 0.02 ppm

and the highest, 1.35 ppm. The waters of C3 and C4 class contained Li in safe limit (0.05 ppm or less). The average Li content of C5 class waters was 0.06 ppm, which is higher than permissible concentrations. In waters of class C6 the average Li content was 0.35 ppm, considered to be very toxic. Ground waters of high salinity contain higher concentrations of Li. The waters with electrical conductivity of 4000 micromhos/cm at 25 degrees C or less are less susceptible to toxic concentrations of Li; waters of C6 may contain Li in amounts that may be toxic to crops.--Copyright 1973, Biological Abstracts, Inc.
W74-10908

THE PRINCIPLES OF SUBSTANTIATING PERMISSIBLE CONCENTRATIONS OF RADIOACTIVE SUBSTANCES IN FRESHWATER BODIES (PRINTSIPY OBOSNOVANIYA DOPUSTIMYKH KONTSENTRATSIY RADIOAKTIVNYKH VESHCHESTV V VODE PRESNOVODNYKH VODOYEMOV),
For primary bibliographic entry see Field 5G.
W74-10912

INTERACTION OF TEMPERATURE AND MOISTURE ON IRON AND MANGANESE AVAILABILITY IN SOILS,
Quebec Ministere de l'Agriculture et de la Colonisation. Div. of Soils.
For primary bibliographic entry see Field 2G.
W74-10913

EFFECT OF NITROGEN AND PHOSPHORUS AT TWO MOISTURE LEVELS ON THE STATUS OF THE AVAILABLE ZN, CU, MN AND FE IN THE SOIL,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils.
G. Dev, and M. S. Mann.
J Res Punjab Agric Univ. Vol 9, No 2, p 277-281. 1972.
Identifiers: Ammonium sulfate, Copper, Iron, Manganese, *Nitrogen, *Phosphorus, *Soil moisture, Zinc, Hydrogen ion concentration, Loam, *Metals.

Incubation studies in the laboratory were conducted on a loamy-sand soil to study the effect of 3 levels of N (0, 200 and 400 kg N/ha) and 3 levels of P (0, 100 and 200 kg P2O5/ha) alone and in combination at 2 moisture levels (30 and 60% of the saturation percentage). Increasing doses of N, as (NH4)2SO4, decreased the soil pH and increased the status of available Zn and Mn significantly. Increase in the level of P application significantly decreased the status of available Zn and Fe. There was no significant effect of moisture levels, neither was there any significant interaction between any of the 3 factors tested.--Copyright 1973, Biological Abstracts, Inc.
W74-10918

METHODS FOR THE DIRECT DETERMINATION OF HEAVY-METAL POLLUTANTS IN THE ENVIRONMENT,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 5A.
W74-10923

METHYLATION OF MERCURY IN LAKE AND RIVER SEDIMENTS DURING FIELD AND LABORATORY INVESTIGATIONS,
Wisconsin Univ., Madison.
L. W. Jacobs.
Available from University Microfilms, 300 No. Zeeb Rd., Ann Arbor, Mich., 48106 (Order No. 73-23,067). Ph D Dissertation, 1973. 107 p.

Descriptors: *Mercury, *Methane, Pollution, Rivers, Lakes, Onsite investigation, Anaerobic conditions, Aerobic conditions, Absorption, Ecology, Laboratory tests, Sedimentation, Water pollution sources, *Pollutant identification, Oligotrophy, Eutrophication, Lake sediments.
Identifiers: Methylation, *Methyl-mercury, Aqua regia, Atomic absorption spectrophotometry.

The objectives were to determine the amount of methyl-mercury (MeHg) that is produced in the sediments of two contrasting river environments when these sediments were treated with mercuric or phenylmercuric salts, and to determine the amount of MeHg formed in dissimilar lake and river sediments and the characteristics which affect the production and accumulation of MeHg. On-site experimentation was performed at two river sites by sample retrieval of bulk sediment. These samples were analyzed for total Hg using an aqua regia digest and flameless atomic absorption spectrophotometry. Results indicate that Hg losses from stationary sediments are minimal and that sediment transport is the major source of Hg movement in a river system. In laboratory tests, intact sediments from two lakes, one oligotrophic and one eutrophic, and two polluted rivers were treated with PhHgAc and incubated for up to 14 days under anaerobic or aerobic conditions. The amount of MeHg formed in the four sediments differed and seemed to be related to the amount of sulfide present and the general biological activity of the sediments. Biological pathways producing MeHg and methane did not seem to be directly related. (Prague-FIRL)
W74-10924

SYMPOSIUM ON ENVIRONMENTAL QUALITY MONITORING; SYMPOSIUM ON SOURCES AND EVOLUTION OF THE ATMOSPHERIC AEROSOL; GENERAL PAPERS.
For primary bibliographic entry see Field 5A.
W74-10947

PHOTOCHEMICAL AEROSOL FORMATION IN THE ATMOSPHERE AND IN AN ENVIRONMENTAL CHAMBER,
California State Air Resources Board, El Monte.
R. J. O'Brien, J. R. Holmes, and A. H. Bockian.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 33-38, 1974. 6 fig.

Descriptors: *Aerosols, *Air pollution, *Smog, *California, Laboratory tests, Sampling, Pollutant identification.

During the summer of 1969 a sampling program for atmospheric particulates was initiated in the Los Angeles area. A diurnal variation in total particulate concentrations and light scattering was noted at Downtown Los Angeles, with peaks occurring after the initial direct emissions due to traffic had subsided, and coinciding with the rise of various photochemical phenomena such as oxidant formation. Chamber experiments with hydrocarbons produced copious amounts of aerosol reacted with nitric oxide. Paper and thin-layer chromatograms of atmospheric and synthetic (chamber generated) aerosols were similar, with spots corresponding to monocarboxylic acids, dicarboxylic acids, and acid nitrates common to both. The effectiveness of diolefins in producing light-scattering aerosol may be related to their ability to condense on preexisting particles rather than auto-nucleate when present at lower concentrations. (See also W74-10947) (Knapp-USGS)
W74-10955

VIRAL QUALITY MONITORING IN THE POLLUTED AQUATIC ENVIRONMENT,
Delaware Univ., Newark. Dept. of Chemistry.
M. P. Kraus.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 67-69, 1974.

Descriptors: *Monitoring, *Viruses, *Bioindicators, Algae, Pollutant identification, Water quality, Water pollution sources.

A model host/virus system can provide information on principles and mechanisms of virus transfer in water, so that, when the need arises, specific problems of aquatic virology may be solved. In particular, using such a model, blue-green algal cultures can provide a rapid, economical assay for virus in water. Genetic specificities recognizable by such a host can illustrate mechanisms of interspecies transfer among ecologically-related aquatic organisms. (See also W74-10947) (Knapp-USGS)
W74-10963

THE URBAN PLUME OF ST. LOUIS,
Washington Univ., Saint Louis, Mo. Dept. of Mechanical and Aerospace Engineering.
R. B. Husar, D. L. Blumenthal, J. Anderson, and W. E. Wilson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974 Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 70-77, 1974, 4 fig.

Descriptors: *Air pollution, *Mapping, *Sampling, *Missouri, Smog, Winds, Meteorology.
Identifiers: *St. Louis(Mo), Urban heat island.

The urban plume of St. Louis, Missouri was mapped by an instrumented single engine aircraft which continuously measured the aerosol light scattering coefficient, total nuclei concentration, CO, SO2, O3, temperature humidity, and turbulence intensity. Under steady NE, 3m/s wind conditions the urban plume, measured at 35 and 50km downstream from downtown was almost gaussian with and confined to a mixing depth of 1000 m. Simultaneous pilot balloon soundings provided the vertical wind velocity profiles. The horizontal optical depth of aerosol plume added by the metropolitan area to the background was 2.5 while the average vertical optical depth was 0.2. Aerosol mass flow was at least 7,500 kg/hr. Under stagnant wind conditions, at night, strong evidence was found for the existence of an urban heat island with induced vertical air flow rising over downtown. In this case the urban plume is directed vertically and spread radially underneath an elevated inversion layer. (See also W74-10947) (Knapp-USGS)
W74-10964

SO2 OXIDATION MECHANISM IN OLEFIN-NOX-SO2 SMOG,
National Environmental Research Center, Research Triangle Park, N.C.
W. E. Wilson, M. C. Dodge, D. N. McNelis, and J. Overton.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 84-87, 1974. 4 fig, 6 ref.

Descriptors: *Smog, *Sulfates, *Air pollution, *Oxidation, Acids, Chemical reactions.
Identifiers: *Sulfuric acid, *Olefins, Ozone, Photochemical smog.

The atmospheric conversion of SO2 to sulfuric acid and various forms of sulfate is an important process in the global sulfur cycle and in urban areas. In the presence of olefinic hydrocarbons, nitrogen oxides, and light a fast indirect photochemical oxidation of SO2 occurs. There are a number of species present in smog which might react with SO2 to yield SO3: OH, HO2, O, O3, and a variety of oxygenated hydrocarbon radicals. The rates of reaction of SO2 with OH, HO2, O, and O3 are too slow to account for the indirect photochemical oxidation of SO2 in olefin-NOx smog. (See also W74-10947) (Knapp-USGS)
W74-10966

DIRECT DETERMINATION OF THE TOTAL ATMOSPHERIC AEROSOL MASS DISTRIBUTION,
Minnesota Univ., Minneapolis.
For primary bibliographic entry see Field 5A.
W74-10967

COMPARISON OF VOLUME AND MASS DISTRIBUTION FOR DENVER AEROSOLS,
National Environmental Research Center, Research Triangle Park, N.C.
T. L. Durham, W. E. Wilson, K. Willeke, and K. T. Whitby.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 95-101, 1974. 2 fig, 4 ref.

Descriptors: *Sampling, *Aerosols, Instrumentation, Air pollution, Dusts, Particle size, Distribution patterns, Turbidity, *Colorado.
Identifiers: *Denver(Colo).

Airborne particulate matter is sampled by various kinds of impactor-type mass measurement devices. Aerosol dynamics is also studied by measurements with the Minnesota Aerosol Analyzing System (MAAS). From the MAAS data, the volume concentration distribution can be calculated and then compared to mass concentration distribution. The MAAS infers the number distribution through measurements of electrical mobility for submicron particles and optical scattering for particles larger than 0.5 micron, whereas the impactors measure the mass concentration distribution as a function of aerodynamic diameter. Agreement between the measured data is good. The existence of a mode in the coarse particle range above 1 micron is indicated by both systems. A minimum is measured by the MAAS in the range 0.7 to 2.0. In this same size range the impactor's mass concentration decreases from high values for large particles to an approximately constant value for submicron particles. A mode in the submicron range is indicated only by the MAAS measurement. (See also W74-10947) (Knapp-USGS)
W74-10968

MASS AND COMPOSITION OF AN URBAN AEROSOL AS A FUNCTION OF SIZE FOR SEVERAL VISIBILITY LEVELS,
National Environmental Research Center, Research Triangle Park, N.C.
R. K. Patterson, and J. Wagman.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 102-107, 1974. 4 fig, 3 tab.

Descriptors: *Sampling, *Aerosols, Instrumentation, Air pollution, Dusts, Particle size, Distribution patterns, Turbidity, *New Jersey.
Identifiers: Nephelometers.

To determine how variations in aerosol mass, composition, and size distribution accompany variations in visibility in an urban area, an integrating nephelometer was used to monitor visibility and four sets of aerosol samples were taken during different visibility conditions. The sampling site was in Secaucus, New Jersey, approximately three miles west of Manhattan, New York. Samples were collected between September 29 and October 10, 1970. The mass distribution cannot be adequately characterized by a single, log-normal distribution. The mass distribution was fitted to a bimodal distribution and the five parameters defining the two long-normal distributions and the proportion of mass in each were determined. As visibility decreased the amount of mass below 2 microns increased and the MMD of the lower sized mode decreased. Both effects would increase the effective light scattering per unit mass. (See also W74-10947) (Knapp-USGS)
W74-10969

APPLICATION OF ANALYTICAL INSTRUMENTATION TO INDUSTRIAL MONITORING OF AQUEOUS EFFLUENTS,
Union Carbide Corp., South Charleston, W. Va. Dept. of Engineering.
J. W. Sugar, and J. H. Brubaker.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 121-126, 1974.

Descriptors: *Monitoring, *Water pollution control, Industrial wastes, Water analysis, Waste water treatment, Chemical analysis, Analytical techniques, Pollutant identification.

Because of the highly variable chemical composition and hydraulic flow of industrial waste water, it is essential for industrial plants to use instrumentation to characterize pollutant discharges to public waterways. Based on Union Carbide's monitoring experience, a systematic approach to the development of a successful monitoring program is presented. This approach deals with establishing monitoring objectives, initiating a sound laboratory program, implementing on-line monitoring systems, anticipating maintenance and operating problems, determining personnel requirements and utilization of results to achieve maximum program benefits. Various on-line installations are used to illustrate the nature of Carbide's current monitoring program. (See also W74-10947) (Knapp-USGS)
W74-10973

DETERMINATION OF TRACE ORGANIC COMPONENTS IN AQUEOUS WASTES,
Monsanto Co., Saint Louis, Mo.
J. P. Mieure, F. M. Grogan, and M. W. Dietrich.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 127-128, 1974.

Descriptors: *Monitoring, *Water pollution control, *Industrial wastes, Water analysis, Waste water treatment, Chemical analysis, Analytical techniques, *Pollutant identification.

The pollutional significance of a waste water can be assessed only if the individual components in the effluent can be determined down to the levels at which they become environmentally insignificant. Methods that have been found effective for detecting, identifying and measuring many individual organic compounds at these levels in industrial effluents are discussed. These methods can be used to determine if a discharge problem exists, as well as to provide periodic analyses. They can also be used to guide the development of a continuous monitoring system should this be required. Emphasis is placed on methods which use the equipment and apparatus normally found in a plant analytical laboratory and which require a minimum of operator training. Three types of concentration procedures are compared: liquid-liquid extraction, collection in a porous polymer resin column by flowing water through the column, or collection in a porous polymer resin column by passing head space vapors through the column. (See also W74-10947) (Knapp-USGS)
W74-10974

WATER SAMPLING,
National Bureau of Standards, Washington, D.C.
P. D. LaFleur, and S. H. Harrison.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 129-134, 1974. 3 ref.

Descriptors: *Sampling, *Monitoring, *Water pollution control, Water analysis, Analytical techniques, Water quality control, *Pollutant identification.

Water quality control must use a total system approach. The particulates in the water, sediments, and organisms living in the water and in the sediments must be evaluated. Because of many variations the problems of obtaining representative samples are extremely difficult. Much of the analytical work being done today is being done on samples which do not really define the system in which they are taken. Too little care is given to the type of sampler involved, the contribution that that sampler may make to the components of interest in the analysis, and the stability of these components over a long period of time. (See also W74-10947) (Knapp-USGS)
W74-10975

ENVIRONMENTAL ANALYSIS OF OCEAN DUMPING,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
G. V. Cox, and S. Townsend.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 155-156, 1974.

Descriptors: *Monitoring, *Sea water, *Water pollution sources, *Path of pollutants, Waste disposal, Remote sensing.

Concern for marine protection requires field monitoring programs in water, marine life and sediment quality. Ocean currents carry disposed wastes away from the dump zones. This requires a large field monitoring program. Mathematical models to predict dispersion and deposition require continuous current measurements at several depths in the water column. These models are necessary to predict zones of maximum potential impact. Use of ERTS - 1 Satellite real color and multispectral analysis helps to verify these models. (See also W74-10947) (Knapp-USGS)
W74-10977

TRANSMETHYLATION OF HEAVY METAL IONS IN WATER,
National Bureau of Standards, Washington, D.C.
K. L. Jewett, and F. E. Brinckman.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 218-225, 1974. 7 fig, 1 tab, 16 ref. EPA Grant R 801002.

Descriptors: *Heavy metals, *Mercury, *Path of pollutants, Chemical reactions, Organic compounds, *Ions.
Identifiers: *Platinum, *Palladium, *Transmethylation, Metal-organic compounds.

Biological transformations play an important role in aquatic transport of toxic metal. Thus for the palladium (II) or platinum (II) reactions with CH_3Hg, or with either $(CH_3)_3Sn$ or $(CH_3)_3Pb$, a rapid initial demethylation of the Main Group metal ion occurs, followed by a slower decomposition of transition metal methyl intermediates to eliminate available active methyl groups as inert organic gases liberated from the aqueous medium. The inhibitory or accelerative influence of anions is made very apparent. Strong ligands such as CN or SCN impede the initial transmethylation step. The formation and decomposition of the cis-dimethyldichloropalladium (II) anion with concomitant ethane ejection proceeds at a rate more rapid than the formation and decomposition of its

methyltrichloropalladium (II) precursor. This behavior is qualitatively consistent with the general appearance of several of the transient peaks seen in the NMR spectra. (See also W74-10947) (Knapp-USGS)
W74-10983

THE FLOW OF TRACE ELEMENTS THROUGH THE LOS ANGELES BASIN: ZN, CD, AND NI,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
J. J. Huntzicker, C. I. Davidson, and S. K. Friedlander.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 245-250, 1974. 3 fig, 1 tab, 14 ref.

Descriptors: *Path of pollutants, Fallout, *Zinc, *Nickel, *Cadmium, *California, Roads, Water pollution sources, Dusts, Powerplants, *Trace elements, Heavy metals.
Identifiers: *Los Angeles County(Calif).

The two major sources of atmospheric Zn in the Los Angeles area are tire dust and metallurgical emissions. Tire dust contains approximately 1.5 percent by weight Zn. Most of the tire dust is associated with very large particles which settle close to the source. The primary source of airborne Ni is probably the combustion of fuel oil by power plants. The Ni content of fuel oil fly ash from the Pasadena power plant is 2 percent. The total emission of Ni is 260 kg/day. Cd is usually present in Zn ores and is emitted to the atmosphere during Zn smelting operations. Cd fallout rate is bout 5 kg/day. (See also W74-10947) (Knapp-USGS)
W74-10987

THE FLOW OF TRACE ELEMENTS THROUGH THE LOS ANGELES AREA: EFFECT ON NON-URBAN AREAS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
C. I. Davidson, J. J. Huntzicker, and S. K. Friedlander.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 251-255, 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Path of pollutants, Fallout, *Zinc, *Nickel, *Cadmium, California, Roads, Water pollution sources, Dusts, Powerplants, *Trace elements, Heavy metals.
Identifiers: *Los Angeles(Calif).

The effects of Los Angeles as a pollutant source on the surrounding non-urban areas are described. Of particular interest are the coastal waters, which are of economic, recreational and aesthetic importance to the area as a whole. The mass flows of Pb, Zn, Cd and Ni to these waters and also to the mountains and deserts surrounding the Los Angeles basin were studied. At least 3 of the 5.8 tons of Pb which are blown out of the urban basin each day are transported large distances from Los Angeles before being removed from the atmosphere. The effect of the urban basin as a pollutant source extends well beyond the geopolitical boundaries and what is an output for one geographical region is an input for the neighboring region. (See also W74-10947) (Knapp-USGS)
W74-10988

KINETIC STUDIES OF THE STABILITIES OF CHLOROMETHYL METHYL ETHER AND BIS (CHLOROMETHYL) ETHER IN HUMID AIR,
Dow Chemical Co., Midland, Mich.
J. C. Tou, and G. J. Kallos.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 298-299, 1974. 1 tab.

Descriptors: *Air pollution, *Organic compounds, Public health, Chemical reactions, Humidity, *Kinetics.
Identifiers: *Chloromethyl methyl ether.

Chloromethyl methyl ether (CMME) is one of the most commonly used chloromethylating agents in the manufacturing of commercial ionic resins. One of the impurities known to be present in CMME is bis (chloromethyl) ether (bis-CME). Possible industrial exposure to these two molecules and their stabilities in the environmental air are of great concern. The stabilities of these compounds in air at the ppm level were studied at different humidities using a silicone hollow fiber probe coupled with a mass spectrometer. The hydrolysis rate is proportional to the humidity of the air. Experimental data strongly indicate that the hydrolysis does not take place in the gas phase to any significant extent, but is triggered by the reactor surface. (See also W74-10947) (Knapp-USGS)
W74-10997

CARBON-MONOXIDE-INDUCED PARTICLES FROM HOPCALITE CATALYST,
Naval Research Lab., Washington, D.C.
J. K. Musick, and F. W. Williams.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 300-304, 1974. 2 fig, 4 ref.

Descriptors: *Trace elements, *Air pollution, *Heavy metals, *Catalysts, Chemical reactions, Aerosols.

High concentrations of metal-containing condensation nuclei are sometimes thermally induced from stabilized catalysts containing chromium, copper, and nickel under conditions closely resembling those found in automobile exhausts. Also, commercial and developmental catalyst formulations emit fine particles under a broad range of conditions at temperatures varying from 185 to 800C both in filtered air and in a mixture of 3 percent carbon monoxide in nitrogen. The emission of particles from hopcalite catalyst exposed to CO shows a concentration dependence which is related to time. The lower the CO concentration the longer it takes to realize particle production. (See also W74-10947) (Knapp-USGS)
W74-10998

THE PRODUCTION RATE OF SULFATE AEROSOL IN THE STRATOSPHERE: ENVIRONMENTAL IMPLICATIONS OF A STRATOSPHERIC AIRCRAFT FLEET,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Environmental Health Engineering.
J. J. Huntzicker.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 305-309, 1974. 1 fig, 13 ref.

Descriptors: *Sulfates, *Air pollution, *Aircraft, Chemical reactions, *Aerosols.

Stratospheric increases in aerosol loading will change the global albedo and possibly bring about climatic alteration. It is therefore quite important that the problem of aerosols associated with aircraft emissions in the stratosphere be thoroughly investigated. Current domestic jet fuels contain about 0.08% sulfur by weight. (See also W74-10947) (Knapp-USGS)
W74-10999

QUALITY OF WATER AND SUSPENDED SEDI MENTS IN THE BAKSAN AND MALKA RIVERS (O KACHESTVE VODY I VZVESHEN NYKH NANOSOV REK BAKSANA I MALKI),
I. A. Dolgushev.
Pochvovedeniye, No 7, p 137-140, July 1973. 1 fig 3 tab, 7 ref.

Descriptors: *Sediments, *Suspended solids *Suspended load, *Water quality, *Water chemis try, Water analysis, Chemical analysis, Sampling Inorganic compounds, Nutrients, Nitrogen Phosphorus, Potassium, Irrigated land, Irrigatio water, Irrigation, Irrigation canals, Sedimen discharge, Sediment load, Particle size.
Identifiers: *USSR, *Baksan River(USSR) *Malka River(USSR).

Sediment particle size and chemical composition and presence of potassium, phosphorus, nitrogen and elements harmful to plants were determined i sediment discharge and waters of the Baksan an Malka Rivers in 1967-68. Waters of the Baksan an Malka Rivers are suitable for irrigation of all crop grown on irrigated lands of the basin. Suspende river sediments have fertilizing properties and ca be transported to irrigated fields by silt-fre canals. The content of nitrogen, phosphorus, an potassium increases with decreasing particl diameter, reaching a maximum in particles les than 0.05 mm in diameter. (Josefson-USGS)
W74-11012

NEW ANALYTICAL SOLUTIONS FOR DY DIFFUSION EQUATIONS,
Princeton Univ., N.J. Water Resources Program.
For primary bibliographic entry see Field 2E.
W74-11021

ASSESSMENT OF SELECTED RANN EN VIRONMENTAL MODELLING EFFORTS,
Washington Univ., Seattle.
For primary bibliographic entry see Field 6A.
W74-11038

MOLECULAR SIZE AND SPECTRAL CHARAC TERIZATION OF ORGANIC MATTER IN A MEROMICTIC LAKE,
British Columbia Univ., Vancouver. Dept. of Civ Engineering.
For primary bibliographic entry see Field 2H.
W74-11067

ENVIRONMENTAL POLLUTION THROUGH CHEMICAL PROCESSING OF WOOD (UMWELTBELASTUNG DURCH HOLZCHEMISCHE PROZESSE),
W. Schweers.
Mitteilungen der Bundesforschungsanstalt fue Forst- und Holzwirtschaft, No 93 (3. Hamburg Reinbeker Forst- und Holztagung 1973, Holz wirtschafliches Symposium 15. bis 16. Mai 1973), 171-183, Sept 1973. 12 tab, 6 ref.

Descriptors: *Pulp wastes, *Wast water(Pollution), *Pulp and paper industry, Ai pollution, Water pollution sources, Waste wate treatment, Biochemical oxygen demand Suspended solids, Lignins, Fibers(Plant), Oxygen Bleaching wastes, Sulfur compounds, Organi loading, Industrial wastes, Effluents.
Identifiers: *Germany(West Germany).

Water and air pollution caused by the West Ger man forest products industries and methods fo environmental control are discussed and evalu ated. Statistical data are tabulated for yearly ton nage productions of chemical (sulfite and kraft and mechanical (groundwood) pulps, paper an paperboard, hardboards, insulating and relate building boards, along with indications of the cor responding 5-day BOD, suspended solids, and at mospheric emission loads of mill effluents. Th total 5-day BOD of all German wood-chemical in

dustrial wastes was estimated at 175,420,000 t in 1970. Various methods for reductions in BOD, water and chemical consumptions, and fiber and lignin losses are indicated. Most of the systems of practical use are based on the recycling of condensates and other process streams, some with and some without full or partial biological treatment of effluents. Oxygen bleaching of pulp and the possible development of non-sulfur pulping processes for prevention of pollution are also mentioned. (Ward-IPC)
W74-11074

THE USE OF AN ELECTRON CAPTURE DETECTOR FOR THE DETERMINATION OF PESTICIDES IN WATER,
Ustav Hygieny, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 5A.
W74-11077

MERCURY ORGANIC MATTER ASSOCIATIONS IN ESTUARINE SEDIMENTS AND INTERSTITIAL WATER,
Florida State Univ., Tallahassee. Dept. of Oceanography.
S. E. Lindberg, and R. C. Harriss.
Environmental Science and Technology, Vol 8, No 5, p 459-462, May, 1974. 1 fig, 2 tab, 22 ref.

Descriptors: *Mercury, Ecological effects, *Organic matter, *Interstitial water, Sediments, Solubility, Salinity, Environmental control, Estuaries, *Florida.
Identifiers: *Anthropogenic additions, *Florida Everglades, *Mobile Bay Estuary.

Potential ecological effects of anthropogenic additions of mercury to natural environments are studied in the Florida Everglades and Mobile Bay Estuary. Significant associations were found between sediment mercury and sediment organic matter and between dissolved interstitial mercury and dissolved organic carbon. Interstitial water and sediments were sampled, both from surface and subsurface areas. With limited data, it appears that increasing salinity has a negative effect on the mercury complexing capacity of the dissolved organic matter. Interstitial dissolved mercury is enriched from 2.6 to 36.0 times over the associated surface water values, and in sulfide-rich pore waters far exceeds the thermodynamic solubility of HgS. This enrichment is probably due to formation of organic and polysulfide complexes with mercury. (Prague-FIRL)
W74-11122

HISTORY OF METAL POLLUTION IN SOUTHERN CALIFORNIA COASTAL ZONE,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W74-11130

MERCURY CONTAMINATION OF VEGETATION DUE TO THE APPLICATION OF SEWAGE SLUDGE AS A FERTILIZER,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering; Toronto Univ. (Ontario). Dept. of Geology; and Toronto Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11133

MAINTENANCE DREDGING, NEW HAVEN HARBOR, CONNECTICUT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 4C.
W74-11140

A BILL TO PROVIDE FOR A FEDERAL ECOLOGICAL PRESERVE.
For primary bibliographic entry see Field 6E.
W74-11150

OIL POLLUTION AND MARINE ECOLOGY,
University Coll. of Swansea (Wales). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-11166

HYGIENIC EVALUATION OF SURFACE WATERS IN THE TRANSCARPATHIAN REGION, (IN RUSSIAN),
N. F. Grishchenko, M. Yu. Blyumberg, and V. A. Sabov.
Gig Sanit. Vol 37, No 7, p 95, 1972.

Descriptors: *Surface water.
Identifiers: Transcarpathia, USSR.

Most of the surface water in the Transcarpathian region of the USSR is hygienically satisfactory due to a high dilution factor and self-purification. Increasing effluent discharge requires additional waste water treatment facilities.--Copyright 1974, Biological Abstracts, Inc.
W74-11171

ECOLOGICAL RESEARCH, ERADICATION OF MOSQUITOES, AND PROTECTION OF NATURE,
Universite Scientifique et Medicale de Grenoble (France).
G. Pautou, B. Gilot, and G. Ain.
Nat Belg. Vol 54, No 3, p 105-115, 1973. Illus.

Descriptors: *Organophosphorus pesticides, Biodegradation, Insect control.
Identifiers: Aedes cinereus, Aedes sticticus, Aedes vexans, Anopheles maculipennis, Carex acutiformis, Culex pipiens, Culiseta annulata, Culiseta morsitans, Lysimachia nummularia, Mosquitoes, Pharagmites communis, Ranunculus repens, Valeriana officinalis, Rhone Valley.

The proliferation of mosquitoes in the Rhone Valley, notably between Seyssel and Lyon (France), has necessitated ecological studies in order to eradicate the mosquitoes while maintaining maximal biological equilibrium. Of the 25 spp. of mosquitoes, only the 8 which are harmful to man were the object of the present anti-larval campaign. Eradication is being carried out on 4 ecological levels. Level 1 (permanently immersed Phragmites communis) contains species which lay eggs on the water: Culiseta morsitans, Culex pipiens, Anopheles maculipennis, Culiseta annulata. Level 2 (Phragmites communis and Carex acutiformis) contains species of Aedes with average to short larval cycles. Leverl 3 (Carex acutiformis and Valeriana officinalis) contains species of Aedes with average to short larval cycles. Level 4 (Ranunculus repens and Lysimachia nummularia) is infested with Aedes of short larval cycles: A vexans, A. sticticus and A. cinereus. Only minimal doses of biodegradable organic phosphorus insecticides with low toxicity for surrounding fauna are used, and chemical treatments are applied only to deposits containing larvae of target species. Physical techniques (e. g., sanitary engineering, maintenance of ditches and drains) yielded satisfactory results. This plan has successfully controlled harmful mosquitoes with minimal environmental pollution. Similar programs are being carried out on the Mediterranean and Atlantic coasts of France.--Copyright 1974, Biological Abstracts, Inc.
W74-11189

INVESTIGATIONS ON THE VIABILITY OF TRICHOMONAS VAGINALIS IN TAP WATER AND PUBLIC SWIMMING POOLS, (IN RUSSIAN),
Bonn Univ. (West Germany). Institut fuer Medizinische Parasitologie.
G. Piekarski, M. Saathoff, and D. Stueer.
Zentralbl Bakteriol Parasitenkd infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 157, No 2/3, p 202-214, 1973. English summary.

Descriptors: *Potable water, *Swimming pools.
Identifiers: *Trichomonas vaginalis.

T. vaginalis from cultures and vaginal secretions were suspended in tap water and bath water (Cl content: 0.44-0.56 mg/l). Different survival times were obtained, depending on the density of trichomonads. About 15 cells/2 million trichomonads survived up to 8 hr in 5 ml tap or bath water. Only a few trichomonads survived after 10 min in 240-480 ml tap water, and only up to 5 min in the same amount of bath water. Inundiluted culture medium (kept at 22C) a few trichomonads were capable of reproduction for up to 8 days and up to 24 hr in freshly obtained, undiluted vaginal secretion. Bath water and filter sludge from a public bath contained, in addition to free-living flagellates and ciliata, isolated worm eggs and nematode larvae, but no trichomonads. Free-living flagellates demonstrated microscopically could not be cultured. Trichomonads can be kept alive for a longer time in undiluted vaginal secretaion. Direct contact with toilet seats or bath grids contaminated with trichomonad secretion will easily cause infection. Wet bathing suits must not be exchanged.--Copyright 1974, Biological Abstracts, Inc.
W74-11193

FORECASTING OIL SLICK BEHAVIOR--A PRELIMINARY GUIDE,
Coast Guard, Washington, D.C. Applied Technology Div.
F. L. Orthlieb.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-762 358, Price $3.00 printed copy; $2.25 microfiche. Office of Research and Development In-House Study Report 724107.1, July 1971. 9 p, 2 fig, 3 ref.

Descriptors: *Oil pollution, *Oil spills, *Path of pollutants, Winds, Currents(Water), Oily water, Water pollution sources.
Identifiers: *Oil slicks.

A method is proposed for predicting the behavior of oil slicks at sea. It permits estimation of the growth of an oil slick due either to a sudden release of a known volume of oil, or to a continuous oil flow. Empirical observations are used as the basis for estimating slick drift due to wind and currents. The results for slick growth and drift can be combined to produce an approximate forecast of slick size and position versus time, as an aid to pollution control and cleanup activities until such time as more sophisticated modelling techniques are developed. (Knapp-USGS)
W74-11202

ENVIRONMENTAL EFFECTS OF PETROCHEMICAL WASTE DISCHARGES ON TALLABOA AND GUAYANILLA BAYS, PUERTO RICO,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5C.
W74-11228

EFFECT OF CATTLE FEEDLOT VOLATILES, ALIPHATIC AMINES, ON CHLORELLA ELLIPSOIDEA GROWTH,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 5C.
W74-11238

SOME BACTERIOLOGICAL ASPECTS OF LAKE VILA (GERONA, SPAIN),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
For primary bibliographic entry see Field 2H.
W74-11239

EFFECTS OF SPREADING MANURE ON GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. C. Barker, and J. I. Sewell.
Presented at the 1972 Annual Meeting, American Society of Agricultural Engineers, Hot Springs, Arkansas, June 27-30, 1972, Paper No 72-203, 10 p, 4 tab, 8 ref.

Descriptors: *Farm wastes, *Agricultural runoff, *Groundwater, *Irrigation, *Waste disposal, Sampling, Biochemical oxygen demand, Dairy industry, Slurries, Physical properties, Bacteria, Nitrates, Nitrogen, Dissolved solids, Chloride, Runoff, Surface runoff, Oxidation.
Identifiers: *Manure, *Spreading, Saturation area, Fecal coliform bacteria, Orthophosphate.

An experimental manure slurry irrigation system was established and the effects of the surface spreading of dairy manure slurry on surface runoff and groundwater quality were studied. Grab samples of surface and groundwater were collected on several dates between May 1971 and May 1972. Bacteriological analyses were performed on the samples for both total and fecal coliform bacteria. 5-day biochemical oxidation demand tests were conducted. The dissolved solids content of the filtered samples was determined, as well as nitrate nitrogen, orthophosphate, and chloride contents. Except for isolated cases, the bacterial and chemical concentrations of water samples from an area saturated with manure slurry were within the permissible criteria for raw water for public supplies. (Cartmell-East Central)
W74-11240

FECAL ELIMINATION OF ESTROGENS BY CATTLE TREATED WITH DIETHYLSTILBESTROL AND HEXESTROL,
Purdue Univ., Lafayette, Dept. of Animal Science.
M. R. Callantine, M. Stob, and F. N. Andrews.
American Journal of Veterinary Research, Vol 22, p 462-465, May, 1961. 2 tab, 13 ref.

Descriptors: *Farm wastes, *Cattle, *Sampling, Water pollution, Soil contamination, Fertilizers, Solid wastes, *Waste treatment.
Identifiers: *Estrogens, *Diethylstilbestrol, *Hexestrol, Hormones.

The estrogenic activity of the feces of estrogen-treated and control heifers in 6 groups was determined during a 24-week period following initiation of hormone treatment. Animals given 10 mg. of diethylstilbestrol orally per day excreted significantly more estrogen than did the controls or heifers subcutaneously treated with 24 or 36 mg. of either diethylstilbestrol or hexestrol. This excretion was uniformly high for the entire experimental period. Subcutaneous implantation with 36 mg. of diethylstilbestrol resulted in a greater total estrogen excretion than treatment with 24 mg. However, significant amounts of estrogen were excreted for 60 days following treatment with 24 mg. of diethylstilbestrol when compared to that excreted for 51 days following 36 mg. implantations; after this time, fecal estrogen elimination of heifers in both groups was similar to the controls. Implantation of heifers with 24 or 36 mg. of hexestrol did not result in greater fecal estrogen produced significant weekly variation in estrogen excretion. (Hargrove-East Central)
W74-11245

APPLIED AND RESIDUAL NITRATE-NITROGEN EFFECTS ON IRRIGATED GRAIN SORGHUM YIELD,
Texas A and M Univ., Lubbock. Agricultural Research and Extension Center.
For primary bibliographic entry see Field 3F.
W74-11270

NITROGEN MINERALIZATION POTENTIALS OF SOILS,
Agricultural Research Service, Beltsville, Md. Soils Lab.
For primary bibliographic entry see Field 2G.
W74-11272

RESIDUAL EFFECTS OF N15-LABELED FERTILIZERS IN A FIELD STUDY,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-11276

PRIMING EFFECT OF N-15 LABELED FERTILIZERS ON SOIL NITROGEN IN FIELD EXPERIMENTS,
Arizona Univ., Tucson. Dept. of Soils.
R. L. Westerman, and L. T. Kurtz.
Soil Science Society of America Proceedings, Vol 37, No 5, p 725-727, September-October, 1973. 1 tab, 15 ref.

Descriptors: *Nutrient removal, *Nitrogen, Leaching, Crop response, Water pollution sources, Fertilizers, Stable isotopes, Isotope studies, *Radioisotopes, *Sudangrass.

Evidence of the 'priming effect' on the uptake of soil N by additions of conservative amounts of fertilizer N was examined in data from two recently reported field experiments. In these experiments, urea and oxamide each labeled with N15 were compared on adjacent locations in successive years with 'Sudax SX11' Sorghum-sudan hybrid as the test crop. Additions of N fertilizer increased the uptake of soil N by 17 to 45% in the first experiment and by 8 to 27% in the second experiment. In the residual cutting of the first experiment, increase in uptake of soil N by the crops speculated to be due to stimulation of microbial activity by N fertilizers which increased mineralization of soil N, thus making more soil N available for use by plants. (Skogerboe-Colorado-State)
W74-11279

USE OF NERITIC TROPHODYNAMIC CHAIN OF MOLLUSCS FOR THE STUDY OF THE TRANSFER OF METALLIC POLLUTANTS, (UTILISATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE NERITIQUE A MOLLUSQUES POUR L'ETUDE DES TRANSFERTS DES POLLUANTS METALLIQUES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 5C.
W74-11287

TRACE METALS IN SEDIMENTS AND BIVALVE MOLLUSCA IN SOUTHAMPTON WATER AND THE SOLENT,
General Electricity Generating Board, Fawley, Southampton (England). Marine Biological Lab.
M. G. Romeril.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 31-48, 1974. 9 fig, 6 ref.

Descriptors: *Mollusks, *Trace elements, *Sediments, *Absorption, Clams, Heavy metals, Zinc, Copper, Iron, Iron compounds, Bioassay, On-site investigations, Metals, Seasonal, Age, Path of pollutants, Cooling water, Water pollution sources, Water pollution effects, Power plants, Methodology.
Identifiers: *Mercenaria mercinaria *Cerastoderma edule, Ferrous sulphate, Cockles Hardshell clam, Accumulation.

Two species of bivalve mollusca, the hard shel clam and the common cockle, collected every other month for one year at a number of sites i Southampton Water and the Solent, England, hav been analyzed to determine the concentration o zinc, copper, and iron in their soft tissues. Sedi ment samples from the estuary have also bee analyzed. Significant variations in the metal con tent in the tissues occur with respect to locality age, and season. These variations are discussed i relation to the conditions in the estuary and in par ticular, to metal concentrations in the sediments (Katz)
W74-11288

CONTAMINATION OF MARINE TROPHIC CHAINS BY COBALT 60 (CONSUMPTION OF CONTAMINATED ARENICOLAE BY PLAICE AND CRABS), (CONTAMINATION DE CHAINES TROPHIQUES MARINES PAR LE COBALT 60 (CONSOMMATION D'ARENICOLES CONTAMINEES PAR DES PLIES ET DES CRABES)),
Commissariat a l'Energie Atomique Fontenay aux-Roses (France).
For primary bibliographic entry see Field 5C.
W74-11289

TYPICAL LEVEL OF LEAD IN MYTILUS GALLOPROVINCIALIS LMK FROM THE GULF OF TRIESTE,
Trieste Univ. (Italy).
L. Favretto, and F. Tunis.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 67-74, 1974. 3 fig, 7 ref.

Descriptors: *Lead, *Mussels, Metals, Heavy metals, Analytical techniques, Methodology, Sampling, Quality control, Statistical methods, Statistics, Spectroscopy, Laboratory testing, Absorption, Bioassay.
Identifiers: *Mytilus galloprovincialis, *Gulf of Trieste, *Lead content determination, Atomic absorption spectroscopy, Extraction, Statistical analysis, Bioconcentration.

Lead in Mytilus galloprovincialis Lmk. from the Gulf of Trieste is considered in this study. Quality control of edible mussels is based on the typical average value and on the tolerance limits evaluated from a statistically controlled sampling. A rapid method has been developed for determining the lead content in the edible flesh. This method is based on the extraction of the pyrrolidine dithiocarbamate lead into n-heptan(2) one under controlled conditions and on the determination of the metal in the extract by atomic absorption spectroscopy. Intra-laboratory reproducibility has been defined and factors controlling accuracy have been optimalized. A statistical analysis has been performed on two samples from Duino (2 observations over a year) and from Sistiana (2 over a five-month period). Randomness of the sample has been confirmed and averages and variances between the samples do not differ significantly. (Katz)
W74-11290

LONG-TERM ANNUAL FLUCTUATIONS OF MERCURY IN THE ZOOPLANKTON OF THE EAST CENTRAL ADRIATIC,
Split Inst. of Oceanography and Fisheries (Yugoslavia).
T. Vucetic, W. B. Vernberg, and G. Anderson.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 75-81, 1974. 2 fig, 2 tab, 18 ref.

Descriptors: *Mercury, *Zooplankton, Water pollution sources, Plankton, Path of pollutants, Metals, Heavy metals, Aquatic life, Bioassay, Water pollution, Trace elements, Absorption, Methodology.

Identifiers: *Adriatic Sea, Metal cycling, Polyvinyl chloride production.

The mercury content has been determined in zooplankton (dry weight) collected from two stations in the coastal area from 1964-1969 and from one station in the deep Adriatic from 1967-1969. The mercury content of the zooplankton from the deep Adriatic is higher than in unpolluted areas and averaged 2.86 ppm Hg. It is possible that this is the result of polluting industries located around its shores. In the coastal area the highest values from 3(4)-16 ppm Hg were found in 1964-1965 samples and decreased to approximately 2.0 ppm for the other years. From the results of this study it would seem that the waters of the Adriatic have substantial mercury contamination. (Katz)
W74-11291

FREE AMINO ACID VARIATIONS IN THE ANCHOVY, ENGRAULIS MORDAX (GIRARD) FROM THE LOS ANGELES COASTAL AREA,
Immaculate Heart Coll., Los Angeles, Calif. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-11294

THE USE OF A MOBILE LABORATORY TO STUDY TEMPERATURE RESPONSE OF FISH,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5C.
W74-11297

THE ACCUMULATION AND RETENTION OF 65ZN AND 54MN BY THE PLAICE, PLEURONECTES PLATESSA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 5C.
W74-11299

THE ACCUMULATION AND RETENTION OF 59FE AND 58CO BY THE PLAICE, PLEURONECTES PLATESSA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 5C.
W74-11300

A SEASONAL SURVEY OF THE FISHES IN THE MYSTIC RIVER, A POLLUTED ESTUARY IN DOWNTOWN BOSTON, MASSACHUSETTS,
Woods Hole Oceanographic Institution, Mass.
R. L. Haedrich, and S. O. Haedrich.
Estuarine and Coastal Marine Science, Vol 2, No 1, p 59-73, 1974. 4 fig, 3 tab, 29 ref.

Descriptors: *Marine fish, Analytical techniques, Biomass, Water quality, Environmental effects, Smelts, Biological communities, Estuaries, Estuarine environment, Seasonal, Statistical models, *Massachusetts.
Identifiers: *Species diversity, *Environmental quality, *Mystic River(MA), Flounder, Alewives, *Boston, Eels, Shad, Herring, Cod, Hake, Cottids, Mackerel, Pollock, Stickleback, White perch, Silvensides.

Twenty-three species of marine fishes were taken in the Mystic River during surveys conducted four times in a year to determine a measure of the environmental quality of the estuary. Winter flounder was the dominant species, with alewives and smelt abundant on a seasonal basis. Diversity H on number of species and on weight was determined and ranged from 0.33 in August to 1.03 in June and from 0.12 in August to 0.75 in March, respectively. During the warmest period, fishes tended to be found in the lower portions of the estuary but in winter they were concentrated upriver. The annual diversity H in the Mystic River is 1.19 (on numbers) and 0.71 (on weight). The values fall near the low end of the diversity scale, indicating a fairly low degree of environmental quality. (Katz)
W74-11302

THE ACCUMULATION FROM SEA WATER OF 65ZN, 54MN, 58CO AND 59FE BY THE THORNBACK RAY, RAJA CLAVATA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 5C.
W74-11304

SHORT TERM FATE OF DIETARY DIELDRIN IN THE DIGESTIVE TRACT OF JUVENILE LAKE TROUT (SALVELINUS NAMAYCUSH),
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
For primary bibliographic entry see Field 5C.
W74-11308

A KEROSENE-LIKE TAINT IN THE SEA MULLET, MUGIL CEPHALUS (LINNAEUS) I. COMPOSITION AND ENVIRONMENTAL OCCURRENCE OF THE TAINTING SUBSTANCE,
Department of Primary Industries, Hamilton, (Australia). Sandy Trout Food Preservation Research Lab.
For primary bibliographic entry see Field 5C.
W74-11312

THE COMBINED EFFECT OF HIGH SALINITY AND TEMPERATURE ON THE SURVIVAL OF YOUNG LIMANDA LIMANDA,
Leeds Univ. (England). Wellcome Marine Lab.
For primary bibliographic entry see Field 5C.
W74-11314

ECOLOGICAL STUDIES IN ARTIFICIAL STREAMS. III. THE SEASONAL CHANGE IN THE RELATIONSHIP OF HETEROTROPH TO PHOTOTROPHIC BIOMASSES IN DIFFERENT SEWAGE CONCENTRATIONS, (OKOLOGISCHE UNTERSUCHUNGEN AN MODELLFLIESSGEWASSERN. III. DIE JAHRESZEITLICHEN VERANDERUNGEN IM VERHALTNIS VON HETEROTROPHER ZU PHOTOTROPHER BIOMASSE BET VERSCHIEDENEN ABWASSERBLASTUNGEN),
Eidgenossische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewasserschutz, Zurich (Switzerland).
For primary bibliographic entry see Field 5C.
W74-11317

ECOLOGICAL STUDIES IN ARTIFICIAL STREAMS. IV. SELF PURIFICATION AND BIOMASS PRODUCTION IN A DOMESTIC SEWAGE GRADIENT, (OKOLOGISCHE UNTERSUCHUNGEN AN MODELLELIESSGEWASSERN. IV. AUSWIRKUNG DER SELBSTEINIGUNG AUF DIE BIOMASSEBILDUNG IN EINEM ABWASSERGRADIENTEN),
Eidgenossische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewasserschutz, Zurich (Switzerland).
For primary bibliographic entry see Field 5C.
W74-11318

DISTRIBUTION OF TOTAL MERCURY IN THE FISHES OF LAKE OAHE,
Environmental Protection Agency, Kansas City, Kans. Region VII.
C. M. Walter, H. G. Brown, and C. D. Hensley.
Water Research, Vol 8, No 7, p 413-418, 1974. 1 fig, 6 tab, 9 ref.

Descriptors: *Mercury, Absorption, Bioassay, Freshwater fish, Sport fish, Analytical techniques, Bass, Pikes, Catfishes, Sediments, Microorganisms, Organic compounds, Path of pollutants, *South Dakota.
Identifiers: *Lake Oahe(SD), *Methyl mercury, Methylation, Crappie, Buffalo fish, Burbot.

The total mercury content of fish and sediment in Lake Oahe, South Dakota was investigated in 1971. Average total mercury concentration of 225 fish flesh samples was 0.27 mg/kg; game fish samples averaged 0.31 mg/kg and nongame fish samples averaged 0.22 mg/kg. Data include total mercury analyses of 43 sediment samples. Results support the contention that a continuous mercury methylation process in the sediments will eventually contaminate a fish population even though analysis indicates undetectable levels of total mercury (<0.2 micro mg/l) in the overlying water. It is also indicated that game fish show a greater propensity to accumulate mercury forms than nongame fish. (Katz)
W74-11319

NUMERICAL INDICES APPLIED TO THE RESULTS OF A SURVEY OF THE MACRO-INVERTEBRATE FAUNA OF THE TAMAR CATCHMENT (SOUTHWEST ENGLAND),
Cornwall River Authority, Launceston (England).
P. M. Nuttall, and J. B. Purves.
Freshwater Biology, Vol 4, No 3, p 213-222, 1974. 3 fig, 1 tab, 39 ref.

Descriptors: *Evaluation, *Water quality, *Invertebrates, Quality control, Theoretical analysis, Water analysis, Bioindicators, Habitats, Biological communities, Sewage effluents, Farm wastes, Water pollution effects, Analytical techniques, Benthos.
Identifiers: *Numerical indices, *Diversity index, *River Tamar(England).

A survey of the macro-invertebrate fauna in the River Tamar shows a division of the catchment can be made which separates an organically enriched upper region from a more stable environment in the lower tributaries and reaches. Invertebrate species associated with organic pollution were found downstream from farm waste and sewage effluent outfalls. Invertebrate species normally associated with an unpolluted condition were widely distributed throughout the catchment, and revealed that the Tamar is essentially free from gross pollution causing the elimination of stream fauna. Systems used by pollution control organizations to codify biological results are reviewed and applied comparatively to the results. The Diversity index was found to be the most consistent method in assessing the biological state of the river. (Katz)
W74-11322

CHLORINATED INSECTICIDE RESIDUES IN THE EGGS OF SOME FRESHWATER FISH,
Iowa Univ., Iowa City. State Hygienic Lab.
For primary bibliographic entry see Field 5C.
W74-11323

ECOLOGICAL IMPLICATIONS OF HEAVY METAL IN FISH FROM THE SEVERN ESTUARY,
Bath Univ. (England).
For primary bibliographic entry see Field 5C.
W74-11325

METHYLMERCURY EXPOSURE, MERCURY LEVELS IN BLOOD AND HAIR, AND HEALTH STATUS IN SWEDES CONSUMING CONTAMINATED FISH,
National Swedish Food Administration, Stockholm. Dept. of Food Research.
S. Skerfving.
Toxicology, Vol 2, p 3-23, 1974. 9 fig, 5 tab, 45 ref.

Descriptors: *Mercury, *Human pathology, Public health, Path of pollutants, Foods, Water pollution, Metals, Bioassay.
Identifiers: *Methylmercury, *Fish consumption, Half-life.

Levels of total mercury in blood cells ranging 8-390 ng/g were found in 162 Swedes who consumed fish containing 0.3-7 mg Hg/kg. Levels were seen to correlate to the age of the subject, with subjects over 40 years of age showing levels above 100 ng/g, and to the concentration of mercury in fish consumed. Long-term exposure to 4 micrograms Hg as methylmercury/kg body weight/day--as estimated from fish intake records--corresponded to a blood cell mercury of about 300 ng/g. The biologic half-time of mercury in blood cells ranged from 58-87 days in 4 subjects, up to 164 days in one individual. No clearcut signs of methylmercury poisoning were found in the screened subjects. Some subjects had various symptoms, but with no statistically higher frequency in the high-mercury (82-1100 ng/g blood cells) group than in the low mercury (12-75 ng/g) group. (Katz)
W74-11330

HEXACHLOROBENZENE (HCB) RESIDUES IN FISH,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
For primary bibliographic entry see Field 5C.
W74-11331

THE OCCURRENCE OF SOME TRACE METALS IN COASTAL ORGANISMS WITH PARTICULAR REFERENCE TO THE SOLENT REGION,
Southampton Univ. (England). Dept. of Oceanography.
T. M. Leatherland, and J. D. Burton.
Journal of the Marine Biological Association of the United Kingdom, Vol 54, p 457-468, 1974. 1 fig, 5 tab, 38 ref.

Descriptors: *Absorption, *Trace elements, *Sediments, Bioassay, Neutron activation analysis, Arsenic compounds, Cadmium, Mercury, Zinc, Bottom sediments, Methodology, Analytical techniques, Algae, Molluscs, Path of pollutants, Environmental effects, Geochemistry, Spectrophotometry, Freshwater, Sewage.
Identifiers: *Bottom mud, *Solent(UK), Accumulation, Antimony, Southampton water, Fucus ssp, Littorina ssp, Tealia ssp.

Measurements were made, by neutron activation analysis, of arsenic, cadmium, antimony, mercury and zinc in organisms and bottom muds from Southampton Water and Solent. The values are on a dry weight basis and refer primarily to whole organism soft tissues. Concentrations of mercury in algae ranged from 0.07 to 0.22 ppm and those in animal tissues from 0.06 to 1.9 ppm. Variations among organisms from different parts of the solent area and comparisons with other regions suggested some possible influences of local waste discharge, but there was no evidence of major effects. Anoxic muds contained higher concentrations of mercury than occurred in unreduced surface layers, suggesting mobility in interstitial waters of the uppermost zone and fixation under reducing conditions. The average concentrations of cadmium in algae and fish from substantially unpolluted waters were 0.3 and 0.03 ppm, respectively, while the range for marine Gastropod and Lamellibranch molluscs was from 0.3 to 21 ppm. Increased concentrations, by about two orders of magnitude, were found in Fucus serratus and Littorina littoralis from the Severn Estuary. Bottom muds from areas of low pollution contained, on average, 0.6 ppm. Concentrations of arsenic in molluscs were in the range from 3 to 24 ppm, while fish muscle contained an average of 5 ppm. Relatively high concentrations occurred in Tealia (72 ppm). Antimony occurred usually in the range from 0.01 to 0.1 ppm, with low values in fish muscle. The average concentrations of arsenic and antimony in bottom muds from Southampton Water were 14 and 1.0 ppm respectively. (Katz)
W74-11332

POLYCHLORINATED BIPHENYLS AND P,P' DDE IN GREEN TURTLE EGGS FROM ASCENSION ISLAND, SOUTH ATLANTIC OCEAN,
Florida Univ., Gainesville. Dept. of Food Science.; and Florida Univ., Gainesville. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-11335

TRACE METALS IN LAKE CAYUGA LAKE TROUT (SALVELINUS NAMAYCUSH) IN RELATION TO AGE,
Corning Glass Works, N.Y. Research and Development Lab.
For primary bibliographic entry see Field 5C.
W74-11336

QUALITATIVE STUDIES ON THE METABOLISM OF NAPTHALENE IN MAIA SQUINADO (HERBST),
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W74-11339

THE GROWTH KINETICS OF ISOCHRYSIS GALBANA IN CULTURES CONTAINING SUBLETHAL CONCENTRATIONS OF MERCURIC CHLORIDE,
Marine Biological Association of the United Kingdom, Plymouth (England).
For primary bibliographic entry see Field 5C.
W74-11340

STUDIES ON THE MECHANISMS OF RED TIDE OCCURRENCE IN HAKATA BAY, 3. THE CHARACTERISTICS OF EFFECTIVE BOTTOM MUD AND ITS GEOGRAPHICAL DISTRIBUTION PATTERN, (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 5C.
W74-11341

THE FLAGELLATA EXAMINED FROM POLLUTED WATER OF THE INLAND SEA, SETONAIKAI,
Hiroshima Univ. (Japan).
For primary bibliographic entry see Field 5C.
W74-11342

COPEPOD AND CHLOROPHYLL A CONCENTRATIONS IN RECEIVING WATERS OF A NUCLEAR POWER STATION AND PROBLEMS ASSOCIATED WITH THEIR MEASUREMENT,
Woods Hole Oceanographic Institution, Mass.
E. J. Carpenter, S. J. Anderson, and B. B. Peck.
Estuarine and Coastal Marine Science, Vol 2, No 1, p 83-89, 1974. 1 fig, 4 tab, 12 ref.

Descriptors: *Cooling water, *Copepods, *Chlorophyll, Plankton, *Thermal pollution, Heated water, Cooling water, Water pollution sources, *Nuclear power plants, Sampling, Methodology, Water quality.
Identifiers: Chlorophylla.

Copepod and chlorophyll a concentrations were measured in the sea water mixing zone of cooling water from a nuclear power plant and in a control area (containing no cooling water). No significant differences were observed between the two areas for these parameters; however, it is known that about 70% of the copepods and 80-100% of the phytoplanktonic photosynthesis are eliminated in the 95,000 cu m/h of sea water entrained through the power plant. From the data collected, which consisted of five replicate plankton tows or chlorophyll measurements at each of four stations on five dates, it was calculated that the sampling program was not able to detect the (approximate) 5% reduction that occurred in population size. These data indicate the importance of determining the ability of a sampling program to measure a population change before concluding that a suspected pollutant has not affected the population. It also shows the inability of conventional methods of measuring plankton densities to detect relatively small changes. (Katz)
W74-11343

BIODEGRADATION OF MIREX BY SEWAGE SLUDGE ORGANISMS,
Florida Univ., Gainesville. Pesticide Research Lab.
P. S. L. Andrade, Jr., and W. B. Wheeler.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 415-416, 1974. 1 tab, 3 ref.

Descriptors: *Sewage sludge, *Biodegradation, Methodology, Analytical techniques, Chromatography, Sludge, Radioisotopes, Aerobic conditions, Anaerobic conditions, Pollutant identification.
Identifiers: *Mirex.

Uniformly labelled 14C-Mirex was incubated with sewage sludge under both aerobic and anaerobic conditions to investigate possible biodegradation of the compound. The data indicate that under experimental conditions, sewage sludge microbes degrade Mirex in anaerobic conditions. The structure of the metabolite and identity of the Mirex-degrading organism are unknown. (Katz)
W74-11345

DDT, DDE, AND PCBS IN THE TISSUES OF REEF DWELLING GROUPERS (SERRANIDAE) IN THE GULF OF MEXICO AND THE GRAND BAHAMAS,
Texas A and M Univ., College Station.
C. S. Giam, R. L. Richardson, D. Taylor, and M. K. Wong.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 2, p 189-192, 1974. 1 fig, 1 tab, 10 ref.

Descriptors: *Gulf of Mexico, *Chlorinated hydrocarbon pesticides, *DDT, *DDE, *Polychlorinated biphenyls, Absorption, Bioassay, Public health, Pollutants, Pesticides, Path of pollutants, Distribution, Reefs, Coral.
Identifiers: *Grouper, *Serranidae, Bahamas, Epinephelus ssp, Mycteroperca ssp.

The levels of chlorinated hydrocarbons in the muscle tissues of groupers were investigated. Groupers spend most of their post larval life in one location, thus providing data most representative of the area, in this case, the coral reefs of the Gulf of Mexico and the Grand Bahamas. Results of the bioassay indicate that the levels of pollutants are generally low with little danger in regard to human consumption. In the locations showing higher concentrations of chlorinated hydrocarbons than the average, the levels of pollutants in the groupers increased with increasing size. The relationship is expected, as the fat content increases with increasing size and age of the specimen. (Katz)
W74-11347

SPECTROCHEMICAL METHOD FOR THE DETERMINATION OF 36 ELEMENTS IN INDUSTRIAL EFFLUENT,
Engelhard Industries, East Newark, N.J. Instrumental Analysis Lab.
For primary bibliographic entry see Field 5A.
W74-11351

CHARACTERISTICS OF ZINC SMELTING INDUSTRIAL WASTE AND SIMULTANEOUS REMOVAL OF TOXIC ELEMENTS AND PHOSPHATES FROM IT,
Indian Defence Lab., Jodhpur.
For primary bibliographic entry see Field 5D.
W74-11354

COPPER CONTENT IN THE INSHORE AND ESTUARINE WATERS ALONG THE CENTRAL WEST COAST OF INDIA,
National Inst. of Oceanography, Panjim (India).
V. N. Sankaranarayanan, and C. V. G. Reddy.
Current Science, Vol 42, No 7, p 223-224, April, 1973. 1 fig, 2 tab, 9 ref.

Descriptors: *Copper, *Water analysis, *Estuaries, Water chemistry, Laboratory tests, Inorganic compounds, Analytical techniques, Spectroscopy, Surface runoff, Productivity, Path of pollutants.
Identifiers: *India.

The occurrence of copper in the chloroplasts, haemocyanin and in several enzymes indicates its importance in controlling productivity. Paradoxically copper concentrations of more than 1 ppm are also known to be toxic to aquatic life. This study was undertaken to determine the distribution of copper in the inshore, estuarine and river waters of the Goa coast. The concentration of copper in the bottom waters was invariably higher than in the surface in the inshore, estuarine and river waters. In the inshore region the surface values ranged from 3-46 micrograms/l and the bottom values between 10 and 76 micrograms/l. High concentrations (greater than 20 micrograms/l) at the surface and at the bottom were encountered at all sections except off Cape Ramas. A general increase in the levels toward the north was also noticeable. The ionic copper concentration in the coastal waters was predominantly controlled by land runoff. There are four important rivers opening into the sea in the region of observation. These rivers flowing through the ore bearing (iron and manganese) terrain might be picking up the element and thus perhaps be responsible for the very high values observed. (Jernigan-Vanderbilt)
W74-11358

THE CONCENTRATION CONTROL OF SOLUBLE COPPER IN A MINE TAILINGS STREAM,
Montana Univ., Missoula. Dept. of Geology.
B. I. Collins.
Geochimica et Cosmochima Acta, Vol 37, p 69-75, 1973. 2 fig, 2 tab, 10 ref.

Descriptors: *Copper, *Mine drainage, *Adsorption, *Hydrogen ion concentration, *Distribution, Drainage water, Chemical reactions, Chemical precipitation, Laboratory tests, Analytical techniques, Spectroscopy, Mine wastes, Surface runoff.
Identifiers: *Malachite, *Tenorite.

The stability fields of cupric hydroxide (determined by a cupric sensitive electrode), malachite ($Cu_2(OH)_2CO_3$), and tenorite (CuO) were compared to the total dissolved copper and hydrogen ion concentration of samples from an abandoned copper mine mill tailings stream and the river into which the stream flows. A loss of four orders of magnitude total dissolved copper from the 0.001 M in the tailings pond water to the 10 to the minus 7th power M in the Ompompanoosuc River is an expected resulted in a terrain where the pH of the water is controlled by carbonate in the local rock and where normal amounts of stream sediment exist. Under such conditions, copper concentrations downstream quickly drop to near background levels. However, the loss of copper where it is not attributable to dilution is probably due to sorption by the iron hydroxide present and is not the result of precipitations of CU(II) solids. (Jernigan-Vanderbilt)
W74-11361

DETERMINATION OF TOTAL MERCURY IN AIR BY CHARCOAL ADSORPTION AND ULTRAVIOLET SPECTROPHOTOMETRY,
National Environmental Research Center, Research Triangle Park, N.C. Quality Assurance and Environmental Monitoring Lab.
For primary bibliographic entry see Field 5A.
W74-11363

SOLVENT EXTRACTION FOR THE SEPARATION OF METALS,
Rutgers The State Univ., New Brunswick, N. J.
For primary bibliographic entry see Field 5A.
W74-11365

THE AVIFAUNA OF SWEDEN AS INDICATORS OF ENVIRONMENTAL CONTAMINATION WITH MERCURY AND CHLORINATED HYDROCARBONS,
Environmental Protection Board, Stockholm, (Sweden). Wallenberg Laboratoriet.
S. Jensen, A. G. Johnels, M. Olsson, and T. Westermark.
In: Proceedings of the XVth International Ornithological Congress p 455-465, 1972, E. J. Brill, Leiden. 7 fig, 2 tab, 33 ref.

Descriptors: *Mercury, *Chlorinated hydrocarbon pesticides, *Birds, Pollutants, Environmental effects, Neutron activation analysis, Water birds, Game birds, Migratory birds, Food chains, Predation, *Bioindicators.
Identifiers: *Sweden.

Predatory birds were used to investigate the historical development of mercury contamination and as biological indicators of environmental contamination. Carnivores were used in these studies because higher concentrations of pollutants associated with the top levels of the food chain made quantitative analysis easier. Analyses of a number of accurately dated specimens of the Goshawk from Sweden indicated that the original level of mercury content of feathers was 2200ng/g. Use of inorganic mercury compounds for seed dressing beginning in the 1940's resulted in levels of approximately 20,000ng/g before legislation was passed prohibiting their use in 1966. The effects of mercury contamination of the aquatic environment on predatory birds were investigated by analyzing the feathers of Osprey and the Great Crested Grebe, both of which live chiefly on fish. The increase of mercury in these species was gradual. The seasonal migration of the Osprey resulted in mercury concentrations which varied according to the time of year. Birds from brackish water environments exhibited concentrations of mercury and chlorinated hydrocarbons in muscle tissue and extractable fat, respectively. (Jerome-Vanderbilt)
W74-11367

MERCURY POLLUTION,
HSMHA Health Reports, Vol 86, No 5, p 414-415, May, 1971 1 photo.

Descriptors: *Mercury, *Water pollution, *Great Lakes, *Public Health, *Fish, Pollutants, Metals, Environmental effects, Effluents, Industrial wastes, Sediments, Regulation, Water quality control, Data collections, Flow, Human pathology.
Identifiers: *Lake St Clair, *St Clair River.

A brief general report on the sources of mercury pollution and its effects is presented. Mercury pollution in the Great Lakes area resulted from the dumping of untreated effluents by chloralkali factories, paper manufacturing plants, and other industrial sources. Government action prohibited all commercial fishing in the Michigan waters of Lake St. Clair and the St. Clair River, and industrial plants have generally ceased the dumping of mercury. The Food and Drug Administration has set 0.5 ppm as a safe mercury level and some fish in Lake St. Clair have exhibited mercury concentrations as high as 7ppm. Although the flushing time of the lake is one year, this does not apply to the lake bottom sediments and the fish; it will take much longer before mercury levels are considered safe. Although there have been no reported cases of mercury poisoning due to Lake St. Clair fish, some minor or early cases may have escaped notice. (Jerome-Vanderbilt)
W74-11368

OXIDATION EFFECT ON THE ANALYSIS OF IRON IN THE INTERSTITIAL WATER OF RECENT ANOXIC SEDIMENTS,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Geology.
B. N. Troup, O. P. Bricker, and J. T. Bray.
Nature, Vol 249, p 237-239, May 17, 1974. 2 fig, 17 ref.

Descriptors: *Iron, *Oxidation, *Sediments, *Sampling, Connate water, Nitrogen, Analytical techniques, Anaerobic conditions, *Chesapeake Bay, Water pollution sources.
Identifiers: *Anoxic sediment.

The importance of oxidation in the studies on the concentration of trace constituents in the interstitial water of anoxic sediments in the Chesapeake Bay was evaluated. Nine cores were taken in rapid succession; a layer of each core, 67-72cm below the sediment-water interface, was extruded, homogenized and loaded into two 2.5cm squeezers. One of the pair of squeezers from each core was never exposed to the atmosphere and was manipulated under nitrogen. The second squeezer of each pair was removed from the nitrogen glove bag after loading and exposed to the atmosphere for 15min with its top removed. An aliquot was taken simultaneously from each of the squeezers after 15ml of interstitial water had been squeezed. It was concluded that discrete sampling and analysis of the aliquot directly from the squeezer, under a nitrogen atmosphere, is the best method of ensuring analytical accuracy, and the rapid change in Fe(II) concentration observed in the initial period of squeezing must result from the oxidation of ferrous ion to ferric hydroxide by the small amount of oxygen trapped in the squeezer during transfer of sediment from the core to the squeezer. (Jernigan-Vanderbilt)
W74-11379

PREDICTING CHELATE PERFORMANCE IN BOILERS,
J. Stephens, and J. Walker.
Industrial Water Engineering, Vol 10, No 4, p 30-32, July/August, 1973. 1 fig, 6 ref.

Descriptors: *Chelation, *Magnesium, *Calcium, *Chemical precipitation, Chemical reactions, Analytical techniques, Spectroscopy, Industrial water, *Nitrilotriacetic acid.

The objective was to determine the ability of NTA to prevent calcium precipitation in the presence of potential precipitating anions such as carbonate, silicate, and phosphate. The results of the study, which was performed in a test boiler operating at 200psi, clearly indicated that: (1) NTA will prevent the deposition of all calcium deposits normally encountered in boilers except calcium phosphate; (2) the amount of calcium that can be chelated by an excess of NTA in the presence of phosphate is so low that the original purpose of chelating agents is defeated by the combined chelate/phosphate treatment; and (3) magnesium deposition will not occur in chelate-treated boilers if the makeup water is at least of sodium zeolite quality, unless the silicate content or alkalinity of the boiler water is abnormally high. (Jernigan-Vanderbilt)
W74-11380

CHARACTERISTICS AND RELATIONSHIPS OF MERCURY-RESISTANT MUTANTS AND METHIONINE AUXOTROPHS OF YEAST,
Rochester Univ. School of Medicine, N.Y. Dept. of Radiation Biology and Biophysics.
For primary bibliographic entry see Field 5C.
W74-11381

MERCURY CONTENT IN FEATHERS OF SWEDISH BIRDS FROM THE PAST 100 YEARS,
Museum of Natural History, Stockholm (Sweden).
For primary bibliographic entry see Field 5A.
W74-11382

THE SEASONAL CYCLE OF COPPER CONCENTRATION IN BUSYCON CANALICULATUM L,
University of South Florida, St. Petersburg. Dept. of Marine Science.
For primary bibliographic entry see Field 5C.
W74-11384

THE DISTRIBUTION OF TRACE METALS IN THE SURFICIAL SEDIMENTS SURROUNDING KEWEENAW POINT, UPPER MICHIGAN,
Wisconsin Univ., Madison. Sea Grant Minerals Program.
P. A. Smith, and J. R. Moore.
In: Proceedings of the Fifteenth Conference on Great Lakes Research, April, 1972, Madison, Wisconsin, Sea Grant College Reprint No WIS-SG-73-341, 11 p, 7 fig, 5 tab, 14 ref.

Descriptors: *Trace metals, *Distribution, *Sediments, *Lake Superior, Data collections, Analytical techniques, Spectroscopy, Copper, Zinc, Cobalt, Nickel, Tin, Drainage, *Michigan, *Path of pollutants, Water pollution sources.
Identifiers: *Keweenaw Point(MI).

Surficial sediments around Keweenaw Point were collected during late August, 1971. The trace metal data for the recovered sediment samples are presented. Determinations are based upon 54 atomic absorption analyses (perchloric acid extraction) for Cu, Zn, Co, Ni, and Sn, using the minus 80 U.S. standard sieve mesh size fraction of the sediments. Indications are that two district areas are delineated by the results, separated from each other by the Keweenaw Fault trending east-west at a latitude of approximately 47 degrees 23 minutes north. To the south of the fault the sediments have mean value trace metal concentrations at 32.2ppm for Cu, 57.3ppm for Zn, 31.1ppm for Ni and 18.7ppm for Co. These concentrations are distributed according to drainage patterns associated with sediments deposited from streams draining a mineralized area. The northern sediments, off Copper Harbor, exhibit higher values, including 160.2ppm for Cu, 79.8ppm for Zn, 53.8ppm for Ni and 23.2ppm for Co. The enhanced concentrations to the north of the Keweenaw Peninsula appear to reflect the dominant geology of the onshore area of the northern coastline. This enrichment is in contrast to the sediments to the south of the fault where the trace metal contribution of drainage from the Peninsula has been diluted by multiple sources of sediments, especially from the Jacobsville Sandstone. (See also W74-11392) (Jernigan-Vanderbilt)
W74-11391

UNDERWATER COPPER EXPLORATION IN LAKE SUPERIOR PROSPECTS MAPPED IN 1971,
Wisconsin Univ., Madison. Sea Grant College Program.
J. R. Moore, R. P. Meyer, and R. J. Wold.
Preprint from the Offshore Technology Conference, Houston, Texas, May, 1972, Paper No OTC 1648, Sea Grant College Reprint No WIS-SG-73-338, 16 p, 11 fig, 8 ref.

Descriptors: *Sediments, *Copper, *Lake Superior, *Trace metals, Geological surveys, Geologic mapping, Seismic studies, Rock properties, Zinc, Cobalt, Tin, Nickel, Magnetic studies, *Michigan, Wisconsin, *Path of pollutants, Exploration, Baseline studies.
Identifiers: *Keweenaw Penninsula(MI).

During the late summer of 1971, marine geologists and geophysicists conducted a combined seismic, magnetometry, and dredging survey in Lake Superior waters surrounding the outer Keweenaw Peninsula. The principal objective of this continuing investigation is to assess the potential for lode copper beneath the shallow waters surrounding the Keweenaw copper producing district. Approximately 1000 track miles of (a) high resolution acoustic profiles, (b) intermediate depth air-gun seismic profiles, (c) continuous magnetometer records, and (d) some 200 dredge and grab samples of the bottom as well as coastal sediments and sublake rock exposures were collected. Subsequent to the cruise, the geophysical records have been under study, and all sediment and rock samples have been analyzed for copper, zinc, cobalt, tin, and nickel. Three areas have been identified as potential interest sites. Chemical and bathymetric data provide an environmental quality baseline in the event of subsequent mining. (See also W74-11391) (Jernigan-Vanderbilt)
W74-11392

FORMATION OF METHYLMERCURY IN A TERRESTRIAL ENVIRONMENT,
National Environmental Research Center, Las Vegas, Nev.
W. F. Beckert, A. A. Moghissi, F. H. F. Au, E. W. Bretthauer, and J. C. McFarlane.
Nature, Vol 249, p 674-675, June 14, 1974 1 fig, 6 ref.

Descriptors: *Mercury, *Bacteria, *Chemical reactions, Organic compounds, Inorganic compounds, Agriculture, Toxicity, Public health, Analytical techniques, Onsite laboratories, Metals, *Path of pollutants, Water pollution sources.
Identifiers: *Methylmercury.

The possible organomercury compound formation in soils contaminated with an inorganic mercury compound by methonogenic bacteria was investigated. Experiments were conducted and the results showed that mercuric salts can, under agricultural conditions, be transformed into methylmercury. The conversion in a terrestrail environment of inorganic mercury compounds to methylmercury implies that recycling of mercury from soil to air and back to soil or water could occur faster than presently assumed on the basis of the volatility of metallic mercury and inorganic compounds along. Due to the formation of methylmercury compounds and their high volatility mercury compounds deposited in soil are more readily available to humans and animals than previously anticipated, the consequent health hazard being magnified by the higher toxicity of methylmercury. (Jernigan-Vanderbilt)
W74-11393

A STUDY OF OIL SOURCE IDENTIFICATION TECHNIQUES,
Coast Guard, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W74-11435

DIGITAL MODELING OF RADIOACTIVE AND CHEMICAL WASTE TRANSPORT IN THE SNAKE RIVER PLAIN AQUIFER AT THE NATIONAL REACTOR TESTING STATION, IDAHO,
Geological Survey, Idaho Falls, Idaho.
J. B. Robertson.
Available from NTIS, Springfield, Va., 22161 a
USGS 1D0-22054, Price $4.00 printed copy; $2.2
microfiche. Open-file report 1D0-22054 (USAEC
TID-4500), May 1974. 41 p, 22 fig, 13 ref.

Descriptors: *Path of pollutants, *Groundwate
movement, *Idaho, *Radioactive wastes
*Mathematical models, Numerical analysis, Finit
element analysis, Dispersion, Sorption, Chlorides
Tritium, Strontium, Cesium.

Industrial and low-level radioactive liquid waste
at the National Reactor Testing Station (NRTS) i
Idaho have been disposed to the Snake River Plai
aquifer since 1952. Tritium and chloride hav
dispersed over a 15sq mi area of the aquifer in lo
but detectable concentrations and have onl
migrated as far as 5mi downgradient fro
discharge points. The movement of cationic wast
solutes, particularly Sr-90 and Cs-137, has bee
significantly retarded due to sorption, principall
ion exchange. Cs-137 has shown no detectabl
migration in the aquifer and Sr-90 has migrate
only about 1.5mi from the Idaho Chemica
Processing Plant discharge well, and is detectabl
over an area of only 1.5 sq mi of the aquifer
Digital modeling techniques were applied by utiliz
ing numerical solution of the coupled equations o
groundwater motion and mass transport. Th
model includes the effects of convective trans
port, flow divergence, two-dimensional hydrauli
dispersion, radioactive decay, and reversibl
linear sorption. Hydraulic dispersion (especiall
transverse) is a much more significant influenc
than previously suggested by earlier studies. Th
model was used to estimate future waste migratio
patterns for varied assumed hydrological an
waste conditions up through the year 2000. Th
hydraulic effects of recharge from the Big Lo
River have an important (but not predominant) in
fluence on the simulated future migration patterns
Detectable concentrations of waste chloride an
tritium could move as much as 15mi downgradien
from the original discharge points by the yea
2000. However, SR-90 could move only 2 to 3m
downgradient in the same time. The model ma
also be used to estimate the effects of the variou
future waste disposal practices and hydrologi
conditions on subsequent migration of wast
products.
W74-11439

MONITORING TOXAPHENE CONTAMINATION IN A GEORGIA ESTUARY,
Georgia Univ., Sapelo Island. Marine Inst.
R. J. Reimold, and C. J. Durant.
Available from NTIS, Springfield, Va. 22161 a
COM 73-10721, Price $3.00 printed copy, $2.2
microfiche. Marine Science Center Technical Re
port Series No 72-8, November 1972. 17 p, 9 fig,
tab, 6 ref.

Descriptors: *Path of pollutants, *Pesticides
*Estuaries, *Georgia, Biomass, Marsh plants
Grasses, Salt marshes, Aquatic environment, Pol
lutant identification.
Identifiers: *Toxaphene, Terry Creek(GA), Spar
tina.

The flux of toxaphene was traced through the sal
marsh cordgrass in an estuary in Georgia. The onl
part of the cordgrass plant accumulating tox
aphene was the leaves (36 ppm). Seed heads hav
relatively low concentrations, and therefore, ma
not be a great source of contamination for marsh
birds which feed upon them. The quantities of tox
aphene found in anchovies collected from severa
collection sites during the two years of the stud
show a significant reduction in levels during th
second year. In a carnivorous fish, Fundulu
heteroclitus, toxaphene shows significan
decreases in levels during the second year, and th
concentrations are much lower than in th
anchovy. Toxaphene appears to be concentrate
in the white shrimp heads and thorax by a factor o
about ten times that found in the edible abdomina
portions. In the 150 species of estuarine organism

ested, the levels of toxaphene were considerably ower in 1971-1972 than in the preceding year. A significant increase in species diversity was found n Terry Creek during the past two years. A considerably higher biomass was detected during the second year of the study. (Knapp-USGS)
W74-11443

5C. Effects Of Pollution

WATER-BORNE TRANSMISSION OF CHLORAMPHENICOL-RESISTANT SALMONELLA TYPHI IN MEXICO,
Institute of Health and Tropical Diseases, Mexico City. Epidemiology Unit.
A. Gonzalez-Cortes, D. Bessudo, R. Sanchez-Leyva, R. Fragoso, and M. Hinojosa.
Bulletin of the Panamerican Health Organization, Vol 8, No 1, p 1-5, 1974. 1 fig, 2 tab, 8 ref.

Descriptors: *Human diseases, *Potable water, *Mexico, *Salmonella, Water pollution sources, Water supply, Irrigation canals, Municipal water, *Epidemics, Water pollution effects.
Identifiers: *Typhoid fever, Salmonella typhi.

In mid-1972 an outbreak of typhoid fever occurred n a small village in Central Mexico. Eighty-three cases were recorded with six deaths. Most patients ived in an area of the village with the highest population density and lowest income levels, close o an irrigation canal which traverses the village. Prior to the epidemic, the municipal water system had not been operational because of a defective pump. Food-specific attack rates implicated the drinking of water from the canal as the source of he disease with restoration of the water system promptly halting the outbreak. (Sandoski-FIRL)
W74-10906

A NEW NATURAL FACTOR IN THE SELF-PURIFICATION OF WATER BASINS (A VIZTAROLOK ONTISZTULASANAK UJ TERMESZETES TENYEZOJE),
G. I. Szidorenko, G. A. Bagdaszarjan, and J. G. Talajeva.
Egeszsegtudomany, Vol 17, No 4, p 350-355, 1973. English summary.

Descriptors: Water pollution effects, Microorganisms, *Pathogenic bacteria, *Water purification, *Self-purification, Potable water.
Identifiers: *Bdellovibrio, Microbial contamination.

The problems of microbial contamination in open water basins and other water sources are discussed with respect to potable water and increasing industrial effects. Some microorganisms in the water and soil are known to kill human pathogens; the most exhaustively studied phenomenon is self-purification by Bdellovibrio in water basins. Culturing, biological features and temperate-zone incidence of the Bdellovibrio have been investigated in detail by the Sisin Institute since 1968. The seasonal changes in their incidence and occurrence of new strains have been documented. (Murphy-FIRL)
W74-10922

METHYLATION OF MERCURY IN LAKE AND RIVER SEDIMENTS DURING FIELD AND LABORATORY INVESTIGATIONS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5B.
W74-10924

EFFECTS OF DIETARY MERCURY ON MINK,
Michigan State Univ., East Lansing. Dept. of Poultry Science.
R. J. Aulerich, R. K. Ringer, and S. Iwamoto.
Archives of Environmental Contamination and Toxicology, Vol 2, No 1, p 43-61, March, 1974. 6 tab, 25 ref.

Descriptors: *Toxicity, Organic matter, Inorganic matter, *Mink, Fish, *Mercury, Great Lakes region, Food chains, Lake Erie, Lakes, Rivers, Canada, Fish toxins.
Identifiers: *Methylmercury, *Mercuric chloride.

Mercury contamination in Lake Erie and other lakes and rivers in the United States and Canada caused mink ranchers to consider the possibility that mink who ingested mercury-contaminated fish were contacting mercury poisoning. Mercury in fish tissue is in the methylated form, highly toxic to man. Tests were conducted where mink were fed dietary methylmercury; 5ppm were lethal within one month to adult mink. Mercuric chloride, the inorganic form, was not toxic at the 10ppm level. Most likely this is because the organic form easily penetrates the brain whereas the inorganic form is excreted from the body. (Prague-FIRL)
W74-10930

A FIELD TRIAL OF ABATE LARVICIDE FOR THE CONTROL OF AEDES AEGYPTI IN BANGKOK, THAILAND,
World Health Organization, Bangkok (Thailand). Aedes Research Unit.
For primary bibliographic entry see Field 5G.
W74-10934

EFFECT OF WATER SALINITY ON THE INCIDENCE OF POSTHODIPLOSTOMUM INFECTION IN FISH, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
V. I. Kozlov.
Gidrobiol Zh. Vol 8, No 3, p 112-113, 1972.
Identifiers: Anisus-contortus, Fish, *Infection(Posthodiplostomum), *Posthodiplostomum-cuticola, *Salinity, *Mollusks, *Pathogenic bacteria.

Increased salinity was tested as a means of eliminating the mollusk Anisus contortus, the intermediate host of the pathogen Posthodiplostomum cuticola, from ponds. Water from the Gorki Estuary with a salinity level of 32.2% was added to a vimba-shemaia breeding pond. In 10 days the salinity decreased from 17.0 to 16.0 g Cl/1; in 20 days it further decreased to 13.0 g Cl/1. A cyclone caused the pond to overflow submerging the aquatic flora where many mollusks were concentrated. Within 35 days no live mollusks were found. In the following year, the incidence of Posthodiplostomum infection decreased from 70% to 10%.--Copyright 1973, Biological Abstracts, Inc.
W74-10938

ENERGETICS OF A HOST-PARASITE RELATIONSHIP AS ILLUSTRATED BY THE LEECH MALMIANA NUDA, AND THE SHORTHORN SCULPIN MYOXOCEPHALUS SCORPIUS,
Guelph Univ. (Ontario). Dept. of Zoology.
T. F. Mace, and C. C. Davis.
Oikos. Vol 23, No 3, p 336-343, 1972. Illus.
Identifiers: Energetics, *Host-parasite relationships, *Leech, Malmiana-nuda, Myoxocephalus-scorpius, *Sculpin(Shorthorn), *Fish parasites, Metabolism.

The energy budget for two groups of sculpin, M. scorpius (L.) was balanced at 10C. An accurate estimate of weekly energy expenditure could be made by calculating the metabolic energy, measuring the waste production and measuring the energy incorporated into new tissue. There was no significant difference between the summed components of energy expenditure and weekly energy input. There was a significant difference between estimated and observed energy expenditure of fish parasitized with a known weight of the leech M. nuda Richardson. This difference was proportional to the biomass of parasites and equal to 2240 cal/g of leech. The resting energy consumption of the leech was estimated from measurements of resting consumption. Stored energy was estimated by measuring the amount of blood in the gut of regularly fed leeches. The data suggest that a leech continuously fed would absorb 1600 cal of energy per week. The ratio of energy loss from the host to energy expenditures of the parasite probably is an indication of the degree of adaptation of the system. A well-adapted host-parasite relationship would exert a metabolic demand which is little more than the energy requirements of the parasite.--Copyright 1973, Biological Abstracts, Inc.
W74-10940

THE CARBON ROD ATOMIC ABSORPTION ANALYSIS OF ARSENIC IN PLANT AND ANIMAL TISSUES,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
For primary bibliographic entry see Field 5A.
W74-10985

EVALUATION OF DIGESTION TECHNIQUES FOR THE AAS DETERMINATION OF METAL CONCENTRATIONS IN KELP,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
For primary bibliographic entry see Field 5A.
W74-10986

CARCINOGENIC SOURCES IN FISH TUMORS FOUND IN THE FOX VALLEY WATER SHED,
Illinois Benedictine Coll., Lisle.
J. J. Hazdra, E. R. Brown, J. Baudendistel, T. Arndt, and L. Keith.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 350-355, 1974. 3 charts, 1 tab, 5 ref.

Descriptors: *Water pollution effects, *Fish diseases, *Illinois, *Canada, Animal pathology.
Identifiers: *Fox River(Ill), *Fish tumors, Carcinogens.

The fish populating the polluted Fox River system of Illinois have a higher frequency of tumors than the same species present in non-polluted Canadian rivers. The frequency was higher from May to October. This seems to correspond to the seasonal bacterial variation in pollution and bacterial count. The main variation in the 2 sites is the chemical nature of the water. As water pollution increased there is a corresponding increase in neoplastic disease in the fish population. (See also W74-10947) (Knapp-USGS)
W74-11006

FILTER SYSTEMS,
Sutcliffe, Speakman and Co. Ltd., Leigh, (England); and Alan Pond Equipment Ltd., Harlow (England). (assignees).
A. Armstrong, and G. C. Fletcher.
U.S. Patent No. 3,810,544, 4 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 922, No 2, p 523, May 14, 1974.

Descriptors: *Patents, *Filtration, *Reclamation, *Activated carbon, *Sands, Conservation, *Wastewater treatment, Reclamined water.
Identifiers: Water reclamation system.

A filter and water reclamation system comprises two filter beds in series, one containing sand and one containing activated carbon granules, half a change of water in a cycle passing only through the sand filter, the other half passing through the sand filter and the activated carbon, the water in the system remaining at a substantially constant volume. (Sinha-OEIS)
W74-11044

ZINC TOXICITY IN HYDROPONIC CULTURE,
Guelph Univ. (Ontario). Dept. of Genetic Botany.
W. E. Rauser.
Can J Bot. Vol 51, No 2, p 301-304, 1973. Illus.
Identifiers: *Beans, *Corn(Field), Cortical cells, *Hydroponic culture, Phenolics, Pollutants, Soil, *Soybeans, *Toxicity, *Zinc.

The symptoms of zinc toxicity in beans, soybeans, and corn are described. In beans and soybeans these include the deposition of a red-brown pigment in parenchyma cells of the cortex, xylem, and phloem of veins, petioles, and stems. The pigment fills some parenchyma cells completely but is confined to the cell walls of others. The xylem vessel lacunae remain free of the pigment. Extensive disorganization of cortical cells is evident in veins. The pigment is suspected to be a polyphenolic substance of unknown biochemical origin.--Copyright 1973, Biological Abstracts, Inc.
W74-11045

SULPHAMERAZINE TOXICITY IN CUTTHROAT TROUT BROODFISH SALMO CLARKI (RICHARDSON),
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
C. E. Smith, J. E. Holway, and G. L. Hammer.
J Fish Biol, Vol 5, No 1, p 97-101. 1973. Illus.
Identifiers: *Cutthroat trout, Fish pathology, Hemorrhage, Kidney, Mortality, Salmo-clarki, *Sulfamerazine, *Toxicity, Water pollution effects, Broodfish.

Treatment of cutthroat trout broodfish with sulphamerazine at 220 mg/kg (10 g/100 lb) of fish/day for 14 days resulted in severe kidney histopathology and increased mortality among males. Experimental data presented showed that the cutthroat trout broodfish were extremely sensitive to sulphamerazine toxicity. Hydropic degeneration of renal tubule epithelium and hemorrhage into tubule lumens were observed in kidneys of both male and female trout, but was more severe in the former. Death, which occurred only in males, was correlated with spawning stress and impaired renal function.--Copyright 1973, Biological Abstracts, Inc.
W74-11068

FISH TOXICITY SURVEY OF FOUR PRAIRIE PROVINCE PULP MILL EFFLUENTS,
Department of the Environment, Winnipeg (Manitoba). Fisheries and Marine Services.
J. S. Loch, and J. C. MacLeod.
Canadian Department of the Environment, Fisheries and Marine Services, Technical Report Series No CEN T-73-4, Feb 1973, 19 p, 1 tab, 10 ref.

Descriptors: *Toxicity, *Pulp wastes, *Bleaching wastes, *Bioassay, *Fish, Canada, Effluents, Pulp and paper industry, Water pollution sources, Industrial wastes.
Identifiers: Kraft mills, Newsprint mills, Static tests, Dynamic tests.

Rainbow trout were exposed to various concentrations of effluents from four Canadian pulp mills under either static or flow-through conditions. Effluents from the bleached kraft mill of Prince Albert Pulp Co. (Saskatchewan) showed little acute toxicity at 65 and 100% concentrations under static or dynamic test conditions, fish survivals exceeding 80%. Effluent from another bleached kraft mill (North West Pulp and Power Ltd., Hinton, Alberta), however, was significantly toxic. At 32% concentration it was lethal to 50% of all fish within 96 hr; in 65% concentration, even treated effluent assured only 10% fish survival under flow-through conditions. Extreme toxicities (less than 15% LC50) were found in both static and dynamic bioassays for effluents from an unbleached kraft pulp mill (Churchill Forest Industries, Pas, Manitoba) and from an integrated newsprint mill (Abitibi Manitoba Paper Co., Pine Falls, Manitoba). The effluent-treatment facilities at each of the four mills studied are outlined. (Witt-IPC)
W74-11075

FACTORS AFFECTING ACUTE TOXICITY BIOASSAYS WITH PULP MILL EFFLUENT,
Department of the Environment, Winnipeg (Manitoba). Dept. of Fisheries and Marine Services.
J. S. Loch, and J. C. MacLeod.
Canadian Department of the Environment, Fisheries and Marine Services, Technical Report Series No CEN-T-74-2, 1974, 37 p, 6 fig, 3 tab, 11 ref, append.

Descriptors: *Toxicity, *Bioassay, *Pulp wastes, *Fish behavior, Analytical techniques, Aeration, Oxygenation, Waste water treatment, Rainbow trout, Trout, Water pollution effects.
Identifiers: Kraft mills, Process variables, Dynamic tests, Static tests.

In studies of the influence of some basic bioassay parameters on the 96-hr acute toxicity values of pulp mill effluent against rainbow trout, flow-through techniques were found to be much more sensitive and replicable than static bioassays. The test temperature also affected the results, high temperatures yielding greater toxicity values. Proper assessment required minimum exposure periods of 96 hr. Aeration did not diminish acute toxicity under flow-through condicions, compared to nonaeration and oxygenation. The measured toxicities of pulp mill effluents varied between different mills, even after secondary treatments. Some toxicity fluctuations, though not excessive, were also found between different samples of the same effluent. (Witt-IPC)
W74-11076

LABORATORY AND CONTROLLED EXPERIMENTAL STREAM STUDIES OF THE EFFECTS OF KRAFT EFFLUENTS ON GROWTH AND PRODUCTION OF FISH,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
C. E. Warren.
NCASI Stream Improvement Technical Bulletin, No 259, Oct. 3, 1972, 93 p. 42 fig, 12 tab, 24 ref, 2 appendices.

Descriptors: *Water pollution effects, *Toxicity, *Fish, *Aquatic fauna, *Pulp wastes, *Waste water treatment, Effluents, Pulp and paper industry, Pacific Coast Region, United States, Salmon, Trout, Snails, Biodegradation, Aquatic life.
Identifiers: Kraft pulp mills.

Results are summarized of a six-year study of the effects of untreated vs. treated kraft pulp and paper mill effluents on the fish production of complex aquatic communities under controlled natural conditions. The fish used in these studies included salmon and trout species of both commercial and recreational importance in the West Coast region. The observed and reported effects include both adverse and relatively harmless influences of kraft mill discharges. They take into account snail and other aquatic populations that serve as fish food, and may serve as illustrative guidelines for the toxicity-reducing efficiencies of various waste water treatment systems, including primary and secondary or biological processes. (Witt-IPC)
W74-11087

POTENTIAL EFFECTS OF THERMAL DISCHARGES ON AQUATIC SYSTEMS,
Washington, Univ., Seattle. Dept. of Civil Engineering.
R. M. Bush, E. B. Welch, and B. W. Mar.
Environmental Science and Technology, Vol 8, No 6, p 561-568, June 1974. 1 fig, 7 tab, 35 ref.

Descriptors: *Aquatic fauna, *Fish, *Thermal pollution, *Water pollution effects, *Cooling water, *Water temperature, Discharge(Water), Rivers, Freshwater, Sea water, Aquatic animals, Invertebrates, Water pollution sources, Sites, Freshwater fish, Marine fish, United States, Mississippi River, Delaware River, Tennessee River, Columbia River.
Identifiers: *Sacramento River.

Ecological changes in the aquatic environment caused by temperature increases are estimated, in order to aid decisionmaking in the siting of cooling water discharges. Principal consideration is given to the fish community, for which predictions of change in composition are based on lethal and preferred temperature. Six representative river systems of the U.S. are considered, viz., the Columbia, Sacramento, Delaware, Tennessee, and Upper and Lower Mississippi Rivers. Insufficient data precluded similar estimations for communities of freshwater invertebrates, but available evidence indicates that adequate protection of fish species will provide similar shelter to other fauna. Hence estimated effects of thermal pollution on freshwater fish can suffice as a guideline for overall protection of aquatic fauna. Similar predictions for marine communities were not feasible, due to lack of thermal requirement data on seawater organisms. Existing data and site studies are summarized for use in guidelines. (Brown-IPC)
W74-11107

THE PHOSPHORUS STATUS OF EUTROPHIC LAKE SEDIMENTS AS RELATED TO CHANGES IN LIMNOLOGICAL CONDITIONS--TOTAL, INORGANIC AND ORGANIC PHOSPHORUS,
Battelle-Pacific Northwest Lab., Richland, Wash.
R. E. Wildung, R. L. Schmidt, and A. R. Gahler.
Journal of Environmental Quality, Vol 3, No 2, p 133-138, April-June, 1974. 2 fig, 3 tab, 19 ref.

Descriptors: Sampling, *Phosphorus, *Sediments, *Eutrophication, *Lakes, Carbon, *Nitrogen, Organic matter, Phytoplankton, Runoff, Biological communities, Surface waters, Turbidity, Water pollution effects, *Oregon, *Lake sediments.
Identifiers: Biological growth, *Upper Klamath Lake(OR).

The role of sediments as a source of phosphorus to lake waters and the factors which may influence sediment phosphorus release were studied. Changes with time in the phosphorus status of noncalcareous sediments of a eutrophic lake were related to changes in sediment carbon and nitrogen, surface water composition, pH, temperature, and phytoplankton growth. Sediment phosphorus status and the relationship of these changes to limnological conditions differed with locations in the lake. Changes in sediment composition were greatest in a bay which received agricultural runoff in the early spring, additional nutrients apparently providing the initial impetus for increased surface water biological activity. This was reflected in increased surface water organic carbon and nitrogen, turbidity, and phytoplankton growth. At this location, total sediment phosphorus, carbon, and nitrogen decreased during the late spring and early summer, corresponding to the period of exponential growth of the lake phytoplankton population. Results indicate that sediment inorganic phosphorus is directly related to the biological productivity of the surface waters, and in at least one location, sediments serve as a significant source of phosphorus to these waters supporting increased biological growth. (Prague-FIRL)
W74-11131

ADVANCED WASTE TREATMENT PROCESS SELECTION, PART THREE,
Culp, Wesner, Culp-Clean Water Consultants Corona Del Mar, Calif.
G. L. Culp, and C. L. Hamann.
Public Works, Vol 105, No 5, p 71-74, May, 1974. 3 fig.

Descriptors: Ammonia, *Chlorination, *Ion exchange, *Suspended solids, Treatment facilities, Coagulation, Filtration, *Wastewater treatment, Nitrogen, Chlorine, Cold, Disinfection, Zeolites, Pilot plants, Phosphorus, *Tertiary treatment, Hydrogen ion concentration.
Identifiers: *Ammonia removal, Solids removal, Breakpoint chlorination.

As part of a study of modification of existing waste water treatment plants to meet higher effluent standards with respect to discharge of suspended solids and aquatic growth nutrients such as nitrogen and phosphorus, a discussion is presented of ammonia stripping, chlorination, ion exchange, and solids removal by coagulation/filtration processes. Ammonia stripping is the only one of the three physical-chemical techniques which has been actually tried on a full plant scale. The process consists of raising the pH of water to 10.8 to 11.5; forming and reforming droplets in a stripping tower; and providing air-water contact and droplet agitation by circulation of large quantities of air through the tower. This method is effective and reliable for nitrogen reduction in climates which are not too cold. For areas of cold weather, other methods such as breakpoint chlorination are necessary. In this method, chlorine is added to waste water containing ammonia nitrogen and reacts with hypochlorous acid to produce chloramines. Six United States plants are planning to use this process. Its advantages are low capital costs, assurance of disinfection, and conversion of ammonia to elemental nitrogen with no disposal problem. Disadvantages are the large increase in total dissolved solids. Selective ion exchange uses zeolites which are selective for ammonia relative to calcium, magnesium, and sodium. It is still in the pilot stage but seems to remove nitrogen without adding objectionable quantities of other materials, and is effective in cold weather. (Prague-FIRL)
W74-11135

THE INTENSITY OF THE FILAMENTOUS ALGAL PHOTOSYNTHETIC ACTIVITY IN THE FLOOD PLAIN LAKE NIZHNII USTUP AND MIDDLE DNIEPER, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. E. Kostikova.
Gidrobiol Zh. Vol 8, No 6, p 104-108. 1972.

Descriptors: *Algae, Photosynthesis.
Identifiers: Cladophora fracta, Cladophora glomerata, Dnieper, Nizhnii, Stigeoclonium lubricum, USSR.

Cladophora fracta Kutz., C. glomerata L. Kutz. and Stigeoclonium lubricum Kutz. were observed for the intensity of the photosynthetic activity. From a study of seasonal change in the photosynthetic activity, in Cladophora of the Back-Lake of Nizhnii Ustup and in Stigeoclonium of the Dnieper (both Ukrainian SSR, USSR), the photosynthesis is very intensive during the summer and fall seasons.--Copyright 1974, Biological Abstracts, Inc.
W74-11157

SEASONAL CHANGES IN THE DRIFT AND BENTHIC MACROINVERTEBRATES IN THE UNCHANNELIZED MISSOURI RIVER IN SOUTH DAKOTA,
South Dakota Univ., Vermillion. Dept. of Biology.
T. C. Modde, and J. C. Schmulbach.
Proceedings South Dakota Academy of Science, Vol 52, p 118-126, 1973. 3 fig, 1 tab, 6 ref. OWRR B-024-SDAK(2).

Descriptors: *Aquatic insects, *Aquatic drift, *Benthic fauna, *Invertebrates, Missouri River, South Dakota, Channel morphology, Standing crops, Seasonal, Diptera, Mayflies, Caddisflies, Systematics, Metabolism, Life cycles, Water level fluctuations.
Identifiers: Trichoptera, Hydropsyche.

Seasonal changes in the taxonomic and quantitative composition of the drift and benthic macroinvertebrates were investigated. Monthly samples were randomly taken from the main channel of the Missouri River at dusk. Drift organisms were collected at the water's surface with a fry net and seasonal variations in both the standing crop and taxonomic diversity were observed. Caddisfly larvae, primarily Hydropsyche spp., dominated the drift macroinvertebrates during the period between October and February. Dipteran larvae, pupae and adults constituted more of the drift standing crop between March and May. During the summer, June through September, the three principal taxa, Chironomidae, Hydropsychidae and Ephemeroptera all increased in the drift samples with neither group dominating during the period. The total benthic biomass also increased during the summer. Little similarity was observed in the taxonomic composition of the drift and benthic communities, with a much greater diversity of organisms found in the drift. The main factors affecting the quality and quantity of the drift fauna were temperature and its effect upon metabolism, life cycle of the insects, and time and rates of water discharge at the Gavins Point Dam. (Jones-Wisconsin)
W74-11160

A COMPARISON OF THE MACROINVERTEBRATE AUFWACHS IN THE UNSTABILIZED AND STABILIZED MISSOURI RIVER,
South Dakota Univ., Vermillion. Dept. of Biology.
A. E. Nord, and J. C. Schmulbach.
Proceedings South Dakota Academy of Science, Vol 52, p 127-139, 1973. 4 tab, 23 ref. OWRR B-024-SDAK(3).

Descriptors: *Periphyton, *Invertebrates, Missouri River, Channel morphology, Systematics, Standing crops, Mayflies, Diptera, Caddisflies, Aquatic insects, Lentic environment, Lotic environment, Benthic fauna.
Identifiers: Trichoptera, Simulium.

Taxonomic composition and standing crop of aufwuchs (all organisms except macrophytes which live attached to substrate) and differences between aufwuchs in stabilized and unchannelized portions of the Missouri River were determined. The samplers used to collect organisms consisted of 'masonite' plates bolted together with spacers so that 9.29 sq dia of substrate was provided for aufwuchs colonization. Samplers were suspended approximately 60 cm below the water's surface for 32 days. All organisms were identified to the lowest possible taxon, usually the generic level. Statistical analyses were accomplished with the aid of an IBM computer using a multivariate analysis program. The basic taxonomic composition of the aufwuchs varied only slightly between stations. The caddisflies, Hydropsyche and Neureclipsis, dominated the aufwuchs on both a standing crop and numerical basis. There were striking differences between fast- and slow-water samplers at each station: slow-water samplers had greater species diversity while fast-water samplers had larger standing crops. Aufwuchs preferring fast-water velocities were Hydropsyche, Baetis, Heptagenia, and Simulium. Slow-water was preferred by Neureclipsis and one or more genera of Caenidae. The unchannelized Missouri River with its diverse habitat types is a better producer of macroinvertebrates than the channelized portion. (Jones-Wisconsin)
W74-11161

A METHOD FOR RAPID IDENTIFICATION OF TYPHOID AND DYSENTERY BACTERIA IN WATER,
Institute of General and Municipal Hygiene, Moscow (USSR).
M. G. Kichenko, and Y. G. Talayeva.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-773 902, $4.00 in paper copy, $2.25 in microfiche. Translated from Akademiya Meditsinskikh nauk USSR, Voprosy Sanitarnoy Bakteriologii i Virusologii, p 166-170, 1965. Air Force Systems Command, Translation Division, FTD-HT-23-519-74, January 1974. 9 p.

Descriptors: *Pathogenic bacteria, *Water analysis, *Analytical techniques, Bioassay, Enteric bacteria, Coliforms, Cultures, Systematics.
Identifiers: Typhoid, Dysentery.

Use of fluorescent sera for early rapid diagnosis of pathogenic coliform bacteria gave good results with pure cultures, but not with mixed cultures. This method is promising only with organisms with a clearly defined antigen structure (Vibrio cholerae, plague bacilli, anthrax bacilli and other dangerous causative agents). However, pathogens of the enterobacteriaceae family are similar in their antigenic nature to various saprophytic bacteria thus fluorescent sera can be of limited use as a rapid method for determining pathogenic bacteria. A combination of methods for shortening bacteriological water analysis give results in 18 hours. In addition to direct methods for isolating pathogens from water, indirect methods in an external medium are being used based on different bacterial properties or chemical composition. Thus, precipitation reaction with hapten in a mixed culture is based on the multisugar complex of pathogens to give a precipitative reaction with specific sera. As an indirect index of infectiosness, use of the ability of a specific (indicating) bacteriophage to multiply only in cells of the corresponding group of pathogens is proposed. These direct methods do not preclude the need for further development of rapid bacteriological methods for direct isolation of pathogenic bacteria. (Jones-Wisconsin)
W74-11162

BIOGEOCHEMISTRY OF A RESERVOIR ECOSYSTEM,
Oklahoma State Univ., Stillwater. Dept. of Chemistry; Oklahoma State Univ., Stillwater. Dept. of Zoology; and Oklahoma State Univ., Stillwater. Reservoir Research Center.
L. P. Varga, D. W. Toetz, and T. C. Dorris.
Available from the National Technical Information Service, Springfield, Va 22161. $4.25 in paper copy, $2.25 in microfiche. Report No 4, September 1, 1972 to June 1, 1973. (ORO-4254-14). 41 p, 5 fig, 15 tab, 15 ref. AEC AT-(40-1)-4254.

Descriptors: *Nitrogen, *Nitrates, *Absorption, *Diurnal, Mathematical models, Analytical techniques, Temperature, Measurement, Oklahoma, Phosphorus, Carbon, Chlorophyta, Chlorella, Cyanophyta, Carbon dioxide, Spectrometers, Phenols, Solar radiation, Biochemistry, Geochemistry.
Identifiers: *Lake Carl Blackwell(OK).

A computation model to predict uptake of nitrate given data on substrate concentration, light, temperature, and cellular nitrogen was developed and evaluated by comparing observed and predicted uptake in Lake Carl Blackwell, Oklahoma. Diel periodicity in nitrogen deficiency was not detected. Nitrite uptake by plankton was observed over a diel period in situ. Nitrite was assimilated both in the dark and the light, but the dark rate was lower by a factor of two. Observations were completed on precision of an in situ method to derive Michaelis-Menten constants for nitrate uptake. Nitrogen, phosphorus, and organic carbon additions, and aeration were applied to water isolated in polyethylene columns. Aeration in columns did not significantly reduce algal numbers. Sedimentary phosphorus was released by stirring and increased algal growth. A laboratory experiment demonstrated which forms of algae overwintered in the sediments. A green and a blue-green alga were monitored simultaneously in laboratory cultures under conditions of low pH, bubbled carbon dioxide, and added nitrogen and phosphorus to evaluate their competitive ad-

vantage. Both species grew at the same rate in filtered lake water and in filtered water with nutrients added. (Jones-Wisconsin)
W74-11164

OIL POLLUTION AND MARINE ECOLOGY,
University Coll. of Swansea (Wales). Dept. of Zoology.
A. Nelson-Smith.
Plenum Press, New York, 1973. 260 p, 52 fig, 20 tab, 694 ref.

Descriptors: *Oil pollution, *Marine biology, *Ecology, Water pollution effects, Ships, Pollutants, Toxicity, International waters, Harbors, Physical properties, Chemical properties, Oil spills, Plankton, Fish, Benthic fauna, Plant populations, Birds, Mammals, Biological communities, Economics, Fisheries, Tourism, Hazards, Emulsions, Dispersion, Sedimentation, Biodegradation, Water pollution sources, Shores, Oil industry, Water pollution control, Diseases.

Technical publications on oil pollution are so numerous that many environmental scientists remain ignorant of its main causes and best cures. This volume combines important features of technical and biological literature, and indicates to industrialists and administrators some complexities of life in the sea and the less direct effect pollution may have on marine ecosystems. Additional stresses imposed by pollution in the marine environment may be determining factors in eliminating localized species from fringes of their range. The usual and most obvious effect of pollution is to reduce diversity. Common pollutants are listed. The petroleum industry has grown with development of tank shipping, which with other shipping and marine terminals and harbors, contribute to oil spills. Spilt oil is examined with reference to its physical and chemical characteristics, behavior at sea, oil carried to the strandline at high-water mark, detection, identification and analysis, and carcinogenesis. Oil effects on marine organisms--plankton, fish, benthic invertebrates, attached plants, birds and mammals is presented, and its effects on populations or communities, and rehabilitation of oiled birds. Economic aspects, fisheries, tourist industry, hazards to life and property are considered. Recommended methods for removing spilt oil complete the book. (Jones-Wisconsin)
W74-11166

EVOLUTION OF THE PLANKTON BIOCENOSIS OF LAKE ANNECY, (IN FRENCH),
Institut National de la Recherche Agronomique, Thonon-les-Bains (France). Station d'Hydrobiologie Lacustre.
For primary bibliographic entry see Field 2H.
W74-11168

RELATIONS BETWEEN THE POLLUTION OF THE CORTIOU SECTOR BY ANIONIC DETERGENTS AND MODIFICATIONS IN POPULATIONS OF CYSTOSEIRA STRICTA, (IN FRENCH),
A. Arnoux, and D. Bellan-Santini.
Tethys. Vol 4, No 3, p 583-586, 1972, Illus. English summary.

Descriptors: *Detergents, Estuaries.
Identifiers: Cortiou, Cystoseira stricta, Marseilles.

A parallel is established between the evolution and the disappearance of the C. stricta community settling on hard substratum in pure water, and the amount in anionic detergents of the superficial waters at the sea-outlet of the sewer of the city of Marseilles (France).--Copyright 1974, Biological Abstracts, Inc.
W74-11174

THE EFFECT OF CUSO4 ALGICIDE DOSES UPON THE ROUTINE METABOLISM OF COMMON CARP (CYPRINUS CARPIO L.) AND PRUSSIAN CARP (CARASSIUS AURATUS GIBELIO (BLOCH)), (IN RUMANIAN),
Academia R. S. R., Bucharest. Institutul de Biologie.
E. Leonte.
Bul Cercet Piscic. Vol 31, No 1/2, p 137-144. 1972. Illus. English summary.

Descriptors: *Copper sulfate, *Algicides, Carp.
Identifiers: Carassius auratus-gibelio, Cyprinus carpio.

The effects of 0.7, 0.5, 0.3 and 0.1 mg CuSO4/1 solutions (algicide doses) on the routine metabolism of common carp (C. carpio) and prussian carp (C. auratus gibelio) were investigated. Algicide doses of CuSO4 had a lethal action on these 2 species. The responses of O2 uptake to toxic actions of CuSO4 solutions had 3 phases: an immediate response, in the first min after exposure to the toxic compound; a stabilization phase in which O2 consumption remained fairly constant; and a third phase, which was characterized by the establishment of asphyxia. Values of routine O2 consumption and duration of phases were dependent upon concentrations of CuSO4 solutions. Death occurred by asphyxia when tissues of gills were damaged and O2 requirements could not be compensated by increase of gill ventilation.--Copyright 1974, Biological Abstracts, Inc.
W74-11176

THE INFLUENCE OF THE EUTROPHIC PROCESS OF WATERS BY ERODED SOIL MATERIAL, (IN GERMAN),
H. Wiechmann.
Landwirtsch Forsch. Vol 26, No 1, p 37-46. 1973. English summary.

Descriptors: *Eutrophication, Phosphates, Suspension, Soil erosion.

In order to determine to what extent eroded soil material can increase the eutropic process of waters by P the reaction of P-dissolution and P-sorption within soil suspensions (Ap-horizons of Loess-soils) with the fractions < micro, < 6 micro and < 20 micro was tested. From total phosphate dissolved out of the suspended soil material during 2-48 hr, approximately 50-67% originate from the P-content of the clay fraction although the suspended P-reserves were almost the same in all 3 grain fractions. The maximum of the dissolved P-shares from the grain fractions was obtained after 2 hr (3-8% from the silt fractions, 11-14% from the clay fraction). Prolongation of the reaction-time only influences the P-solution rate within the silt fractions. The dissolved P-share decreases with the increase of suspended soil with same grain distribution. Concerning the eutropic process of P the phosphates of the clay fraction are of special importance because of high and rapid solubility. Water containing Ca(HCO3)2 used as means of suspension resulted in lower as well as higher P-dissolution rates compared with water, supposedly due to dependence on the binding of P (Ca-phosphate respectively Al + Fe-phosphate) and on their dissolution reactions. However, a clear relationship could not be found. In suspensions with P-containing sewage the P-sorption dominated a possible P-desorption in all tested P-concentrations. The clay fraction is of outstanding importance for the P-binding. Eroded soil material in some cases can lower the risk of eutropic processes by acting as a 'third refinement stage.'--Copyright 1974, Biological Abstracts, Inc.
W74-11207

ENVIRONMENTAL EFFECTS OF PETROCHEMICAL WASTE DISCHARGES ON TALLABOA AND GUAYANILLA BAYS, PUERTO RICO,
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.
M. D. Lail, R. G. Rogers, and M. R. Weldon.
Available from NTIS, Springfield, Va 22161 as PB-215 622, Price $3.00 printed copy; $2.25 microfiche. Technical Study TS-03-71-208-02, October 1971. 102 p, 21 fig, 10 tab, 28 ref, 7 append.

Descriptors: *Water pollution effects, *Bays, *Puerto Rico, Oily water, *Oil pollution, Water pollution sources, Water temperature, Eutrophication, Algae, Chemical wastes, Thermal pollution.
Identifiers: Tallaboa Bay(PR), Guayanilla Bay(PR).

Petrochemical wastes and once-through cooling water discharged into Tallaboa Bay and once-through cooling water discharged by the South Coast Steam Plant into Guayanilla Bay caused violations of Puerto Rico's water quality standards. Dissolved oxygen concentrations in western Tallaboa Bay are below the 4.5 mg/liter minimum requirement. Water temperatures in western Tallaboa Bay and eastern Guayanilla Bay are in excess of the 4 deg F rise permitted. Organic sediment deposits in Tallaboa and Guayanilla Bays contain petrochemical residues. Visible oil and floating solids contaminate western Tallaboa Bay. Standing crop and diversity of the community of macroinvertebrate organisms inhabiting Tallaboa and Guayanilla Bays are reduced. Corals are destroyed by the depositions of oil and detritus in western Tallaboa Bay. Unsightly nuisance growths of filmamentous green algae of the genera Cladophora and Enteromorpha are found along the shorelines of Tallaboa and Guayanilla Bays. (Knapp-USGS)
W74-11228

EFFECT OF WASTE MANAGEMENT AND EGG PROCESSING ON THE FLAVOR OF COOKED EGGS,
Cornell Univ., Ithaca, N.Y. Dept. of Poultry Science.
K. R. Nath, J. M. Darfler, and R. C. Baker.
Poultry Science, Vol 52, No 3, p 1178-1185, May, 1973. 3 fig, 6 tab, 9 ref.

Descriptors: *Farm wastes, *Poultry, Environment, Hydrogen sulfide, *Odor, Effects.
Identifiers: *Eggs, *Flavor, Processing, *Waste management, Cryovac bags, Egg storage, Albumen, Yolk.

Four different chambers used for handling manure were compared in a study undertaken to evaluate the effect of environmental odors on the flavor of soft cooked eggs. Soft cooked eggs were prepared by immersing eggs in boiling water for four minutes. Hard cooked eggs were prepared by heating eggs for 20 minutes in water at 93C. Some hard cooked eggs were stored in shells while other were peeled and packaged in Cryovac bags. All storage studies were done at 5C. Hen-house environment has no effect on the flavor of soft cooked eggs. In hard cooked eggs, the flavor quality of both albumen and yolk deteriorated at one week. When eggs were peeled and packaged in Cryovac bags albumen did not deteriorate as rapidly as eggs stored in shells. The loss of hydrogen sulfide from cooked eggs is responsible for the loss of egg flavor. (Cartmell-East Central)
W74-11236

EFFECT OF CATTLE FEEDLOT VOLATILES, ALIPHATIC AMINES, ON CHLORELLA ELLIPSOIDEA GROWTH,
Agricultural Research Service, Fort Collins, Colo.
A. R. Mosier.
Journal of Environmental Quality, Vol 3, No 1, p 26-28, January-March, 1974. 1 fig, 3 tab, 10 ref.

Descriptors: *Feed lots, *Volatility, Algae, Toxicity, Nitrogen, Ammonia, Effects, *Farm wastes.
Identifiers: *Aliphatic amines, *Chlorella Ellipsoidea, Methyl, Dimethyl, Ethyl, Diethyl, N-propyl, Iso-propyl, N-butyl, Sec-butyl, Dialkylamines.

The purpose of this study was to determine the effect of individual aliphatic amines that have been identified as feedlot volatiles on chlorella ellipsoidea. The amines tested were methyl, dimethyl, ethyl, diethyl, n-propyl, iso-propyl, n-butyl, and sec-butyl. Individual aliphatic amines caused a 50% reduction in population growth of chlorella ellipsoidea at concentrations ranging from 1.2 to 143 ppm amine-N. The more closely the amine structurally resembles ammonia, the greater the inhibitory effect. The primary amines were more toxic than the sec-, iso-, or the dialkylamines. The algae could not utilize any of the amines as N sources either in the presence of adequate N or under N-deficient conditions. (Cartmell-East Central)
W74-11238

INFORMATION ON THE RECENT PRACTICE OF HYGIENIC QUALIFICATIONS OF SURFACE WATERS, (TAJEKOZTATO A FELSZINI VIZEK HIGIENES MINOSITESENEK JELENLEGI GYAKORLATAROL),
For primary bibliographic entry see Field 5G.
W74-11256

THE DISTRIBUTION AND SUCCESSION OF AQUATIC VASCULAR PLANT COMMUNITIES IN RELATION TO PHYSICAL-CHEMICAL CHARACTERISTICS OF VARIOUS LAKES AND PONDS OF THE TANANA VALLEY, CENTRAL ALASKA,
Alaska Univ., College. Inst. of Water Resources; and Alaska Univ., College. Inst. of Marine Science.
L. D. LaPerriere, and B. R. Robertson.
Termination Report, September 1973. 17 p. 1 fig, 9 tab. OWRR A-011-ALAS(1).

Descriptors: *Alaska, *Aquatic plants, *Distribution, *Succession, Physical properties, Chemical properties, Lakes, Ponds, Bottom sediments, Algae, Soil analysis, Water quality, Temperature, Oxygen, Carbon dioxide, Alkalinity, Nitrites, Sulfates, Turbidity, Hydrogen ion concentration, Phosphates, Weather, Organic matter.
Identifiers: *Tanana Valley(AK), Harding Lake(AK), Little Lake(AK).

This report consists of one figure showing the morphometry of Harding and Little Lakes in central Alaska with sampling station locations. The station characteristics are summarized in nine tables regarding the texture of bottom materials (in percentage according to depth) and organic matter content of bottom materials (percentage dry weight), according to depth and station. The species of aquatic vascular plants, algae, and liverwort, occurring in Harding Lake in the summer of 1966 are listed showing the number and dry weight of the plant collections, arranged by station. The occurrence of plant species in quadrat (1 sq m) samples are listed by number and dry weight. The soil analysis data are arranged by plant stand and by plant species. At one station the water quality parameters--temperature, oxygen, carbon dioxide, alkalinity, nitrites, sulfates, turbidity, pH, phosphates and weather--are analyzed. (Jones-Wisconsin)
W74-11282

INFLUENCE OF ORGANIC POLLUTION ON LAKE MARIUT, A HIGHLY EUTROPHICATED LAKE SOUTH OF ALEXANDRIA,
Alexandria Univ. (Egypt). Dept. of Oceanography.
M. A. H. Saad.
In: Revue Internationale d'Oceanographie Medicale, Vol 34, p 23-36, 1974. 3 fig, 1 tab, 20 ref.

Descriptors: *Water pollution effects, *Water pollution sources, *Organic wastes, *Eutrophication, Dissolved oxygen, Environmental effects, Sewage, Industrial wastes, Domestic wastes, Decomposing organic matter, Aquatic environment, Water chemistry, Hydrogen sulfide, Phytoplankton, Freshwater.
Identifiers: *Lake Mariut(Egypt).

Lake Mariut was considered a highly fertile lake until recent years. Increasing population and industry have caused intensive pollution and extreme deterioration of this lake. The decrease in the total fish catch from 9,977,815 kg in 1961 to 1,490,600 kg in 1969 is due principally to the lake pollution. Lake Mariut receives great amounts of untreated domestic sewages and industrial wastes which are enriched with allochthonous organic matter. The phytoplankton blooms, which flourish under favorable conditions, supply the lake with considerable amounts of autochthonous organic materials. Water samples were collected from five different localities of the lake and also from the Qala Drain at its connection with the lake. Concentrations of the dissolved organic matter were established. The maximum value of the organic content of Lake Mariut reached 19.80 mg O2/l in October. The environmental conditions are favorable for the decomposition of great amounts of this organic matter and result in a great decrease in the dissolved oxygen in this lake. Further decomposition of organic matter occurs anaerobically resulting in the production of decomposition gases, particularly hydrogen sulfide. Drainage waters enter the lake more or less continuously and mex-pumps discharge surplus water from the lake into the sea. The polluted lake water, rich in organic matter, may affect the Mediterranean coastal water to the north of Lake Mariut. This influence has not been studied. (Katz)
W74-11283

THE EFFECT OF POLLUTED WATER ON THE ASSIMILATION RATE OF THE BROWN ALGAE ASCOPHYLLUM NODOSUM (L.) LE JOL. AND FUCUS VESICULOSUS (L.) (PRELIMINARY EXPERIMENT),
Institut za Biologijo Sazu, Ljubljana (Yugoslavia).
I. Munda.
In: Revue Internationale d'Oceanographie Medicale, Vol 34, p 53-66, 1974. 2 fig, 1 tab, 29 ref.

Descriptors: *Salinity, *Organic wastes, *Algae, *Distribution, Littoral, Water pollution effects, *Phaeophyta, Aquatic plants, Sewage, Domestic wastes, Methodology, Oxygen, Respiration, Metabolism, Primary producers, Bioassay.
Identifiers: *Fucoids, *Fucus vesiculosus, *Ascophyllum nodosum, Oxygen production, Oxygen consumption, Assimilation rates, Chemical composition.

Studies of the polluted areas of Nordasvatnet in Western Norway revealed that the dominant eulittoral fucoids, A. nodosum and F. vesiculosus, avoid habitats polluted by sewage though salinity conditions would still permit their occurrence. Preliminary experiments studied the effects of organic pollution on the assimilation rate of F. vesiculosus and of A. nodosum, under constant salinity conditions. Polluted water from the inner area of Nordasvtnet was used as medium and the control samples were kept in unpolluted water. In another series of experiments, bacterial and plankton respiration was cut off by means of sterilization and the biggest organic particles were removed by filtration. Oxygen production was found in the control samples and oxygen consumption in the other samples. Results indicated that certain components in the sewage exert a negative influence upon the metabolic activity of the two fucoids, even after bacterial activity had been terminated. F. vesiculosus seems more susceptible than A. nodosum. The results of the preliminary experiments apparently contradict the spatial distribution of the two species in polluted areas, where F. vesiculosus protrudes longer in the neighborhood of sewers than A. nodosum. The distribution in the field seems salinity-conditioned and is in accord with the greater resistance of F. vesiculosus towards dilution. It seems probable that in the vicinity of sewers the influences of organic pollution prevail over the influence of the salinity factor. (Katz)
W74-11284

SOME RESPONSES OF PLANKTONIC ORGANISMS TO ENVIRONMENTAL POLLUTION,
Messina Univ. (Italy). Inst. of Hygiene.
P. Crisafi.
In: Revue Internationale d'Oceanographie Medicale, Vol 34, p 145-154, 1974. 10 fig, 17 ref.

Descriptors: *Copepods, *Water pollution effects, Invertebrates, Zooplankton, Crustaceans, Plankton, Aquatic animals, Organic compounds, Microscopy, Environmental effects, Pathology.
Identifiers: *Morphological changes, *Intestinal prolapse, Acartia ssp, Centropages ssp, Temora ssp, Paracalanus ssp, Italy, Histology.

Morphological deviations of marine and freshwater Copepods of a previously unreported nature are believed to be caused by unfit nutrients such as hydrocarbons or pabulum. These result from environmental changes. Histological investigations show this to be an intestinal prolapse. The muff-shaped appendage on anal segments was found on female Acartia discaudata var. mediterranea, Acartia italica, A. clausi, Centropages humatus, Paracalanus ssp. and both sexes of Temora longicornis. The development of the appendage takes place gradually as evidenced by individual differences and lack of the appendage in some specimens. (Katz)
W74-11285

CHANGES AND SUCCESSION IN THE BENTHIC ALGAL ASSOCIATIONS OF SLIGHTLY POLLUTED HABITATS,
Institut za Biologijo Sazu, Ljubljana (Yugoslavia).
I. Munda.
In: Revue Internationale d'Oceanographie Medicale, Vol 34, p 37-52, 1974. 22 ref.

Descriptors: *Algae, *Benthic flora, *Water pollution effects, *Succession, Benthos, Environmental effects, Organic wastes, Vegetation establishment, Biomass, Primary productivity, Hydrography, Ecology, Salinity, Fjords.
Identifiers: *Fucus ssp, *Adriatic, Green algae, Vegetation pattern, Norway, Blidingia ssp, Pelvetia ssp, Asophyllum ssp, Halopteris ssp.

The effect of sewage on benthic algal associations was investigated in two hydrographically different areas, a land-locked fjord in Western Norway and in the surroundings of Rovinj in the Northern Adriatic. Observations indicated that the fucoids gradually disappear under the influence of sewage in both areas. In the Atlantic, however, they disappear in the following sequence: Pelvetia canaliculata, Fucus spiralis, Fucus serratus, Asophyllum nodosum, Fucus vesiculosus. They are replaced by associations of different Enteromorpha species, which seem to be prolific under the influence of slight organic pollution. In the immediate neighborhood of sewers a Blidingia minima Cyanophyceae association was left. In the Adriatic, fucoids seemed likewise to disappear from areas polluted by sewage. The Cystoseira and Sargassum associations seemed to be rather susceptible and the Fucus virsoides association less. The associations are replaced by Halopteris scoparia, which seems to represent the final stage of succession under conditions of slight organic pollution in the Adriatic, while green algae have a subordinate role in the vegetation pattern. Observations in both regions indicated that the biomass of the benthic algal settlements have decreased under the influence of organic pollution. (Katz)
W74-11286

USE OF NERITIC TROPHODYNAMIC CHAIN OF MOLLUSCS FOR THE STUDY OF THE TRANSFER OF METALLIC POLLUTANTS, (UTILISATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE NERITIQUE A MOLLUSQUES POUR L'ETUDE DES TRANSFERTS DES POLLUANTS METALLIQUES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).

M. Aubert, R. Bittel, F. Laumond, M. Romeo, and B. Donnier.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 7-30, 1974. 6 tab, 36 ref.

Descriptors: *Path of pollutants, *Heavy metals, *Molluscs, *Food chains, Industrial wastes, Water pollution sources, Water pollution effects, Trophic, Copper, Chromium, Zinc, Lead, Mercury, Organic compounds, Ions, Bioassay, Public health, Absorption, Neritic, Effluents, Estuaries, Benthos, Analytical techniques, Methodology, Plankton, Toxicity, Laboratory tests.
Identifiers: *Biological chains, *Accumulation.

Industrial metallic by-products are disposed into the marine environment, thus, they can lead to phenomena of concentration in oceanic organisms and further on to phenomena of toxicity for the final consumer of the biological chains. Results of experiments, carried out in the laboratory, with regard to the transfers of metallic pollutants within a neritic chain with molluscs are discussed. Five metals are taken into consideration with values given for their average concentrations in various organisms. They are copper, zinc, chromium, lead, and mercury, in an ionic form or associated with organic compounds, found in effluents and in oceanic environments. The results are discussed to assess the hazards of pollution presented by activation and chemical products. (Katz)
W74-11287

TRACE METALS IN SEDIMENTS AND BIVALVE MOLLUSCA IN SOUTHAMPTON WATER AND THE SOLENT,
General Electricity Generating Board, Fawley, Southampton (England). Marine Biological Lab.
For primary bibliographic entry see Field 5B.
W74-11288

CONTAMINATION OF MARINE TROPHIC CHAINS BY COBALT 60 (CONSUMPTION OF CONTAMINATED ARENICOLAE BY PLAICE AND CRABS), (CONTAMINATION DE CHAINES TROPHIQUES MARINES PAR LE COBALT 60 (CONSOMMATION D'ARENICOLES CONTAMINEES PAR DES PLIES ET DES CRABES)),
Commissariat a l'Energie Atomique Fontenacy-aux-Roses (France).
C. Amiard-Triquet, and J. C. Amiard.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 49-59, 1974. 3 fig, 3 tab, 13 ref.

Descriptors: *Cobalt, *Cobalt radioisotopes, *Path of pollutants, Metals, Annelids, Trophic level, Crustaceans, Teleosts, Crabs, Radioisotopes, Monitoring, Absorption isotope studies, Analytical techniques, Animal physiology, Nuclear power plants, Laboratory tests, Food chains, Public health, Bioassay.
Identifiers: Plaice, Assimilation, Carcinus maenas, Pleuronectes platessa, Hepatopancreas, Liver, Kidney.

A study was made of the passage of 60Co from the Annelid Arenicola marina to the upper trophic level constituted by the Crustacea Carcinus maenas or the Teleost Pleuronectes platessa. The absorption and the fecal, urinary and branchial excretions of 60Co were measured following the administration of contaminated food during periods from one to five months. The elimination of 60Co by crabs and plaice was monitored during six and three months respectively. Assimilation of radioactive and stable cobalt found as a carrier in the contaminated food varied according to the species; assimilation rates were high in C. maenas and very low in P. platessa. Cobalt isotopes were mainly retained in the hepatopancreas of crabs and in the liver and kidney of plaice. The high concentrations of 60Co in these organs could result in very high but partial internal exposures. They are long-term exposures since cobalt seems to be retained in an unexchangeable form. (Katz)
W74-11289

TYPICAL LEVEL OF LEAD IN MYTILUS GALLOPROVINCIALIS LMK FROM THE GULF OF TRIESTE,
Trieste Univ. (Italy).
For primary bibliographic entry see Field 5B.
W74-11290

LONG-TERM ANNUAL FLUCTUATIONS OF MERCURY IN THE ZOOPLANKTON OF THE EAST CENTRAL ADRIATIC,
Split Inst. of Oceanography and Fisheries, (Yugoslavia).
For primary bibliographic entry see Field 5B.
W74-11291

THE SUBLETHAL EFFECTS OF ENVIRONMENTAL VARIABLES ON POLYCHAETOUS ANNELIDS,
California State Univ., Long Beach. Dept. of Biology.
D. J. Reish.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 83-90, 1974. 1 fig, 11 ref.

Descriptors: *Dissolved oxygen, *Metabolism, *Annelids, Analytical techniques, Methodology, Animal physiology, Respiration, Bioassay, Bioindicators, Water pollution effects, Reproduction, Analytical techniques, Biochemical oxygen demand, Oxygen, Water pollution, Biochemistry, Amino acids, Enzymes.
Identifiers: *Sublethal effects, *Survival, *Polychaetes, Neanthes arenaceodentata, MDH/LDH, Feeding, Egg production, Hemoglobin.

The effects of reduced levels of dissolved oxygen were measured on a laboratory inbred strain of the polychaete Neanthes arenaceodentata. The 28 day TLm value was 0.9 mg/1; 0.95 mg/1 was necessary to enable 50% of the animals to feed, 2.0 mg/1 was required in order to produce 50% of the normal number of eggs, and changes in the MDH/LDH, free amino acid concentrations, and hemoglobin concentration were induced at dissolved oxygen levels of 2.6, 2.7 and 4.2 mg/1, respectively. (Katz)
W74-11292

SUBLETHAL EFFECTS OF DDT ON THE BEHAVIORAL RESPONSES OF BARNACLES TO CHEMICAL AND TACTILE STIMULI,
North Carolina Univ., Morehead City. Inst. of Marine Sciences.
N. Meith-Avcin.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 91-102, 1974. 3 fig, 23 ref.

Descriptors: *DDT, *Behavior, Water pollution effects, Biochemistry, Animal physiology, Pesticides, Larvae, Animal behavior, Methodology.
Identifiers: *Balanus ssp, *Barnacles, *Response patterns, Sublethal levels, Tactile stimuli, Chemical stimuli, Rugophilic, Nervous system, Abnormal behavior.

Barnacles of the species Balanus amphitrite were treated with sublethal levels of DDT to determine changes in their response patterns to chemical and tactile stimuli brought by DDT action to the nervous system. At treatment exposures of 10 micrograms/l for one hour, severe behavioral anomalies were observed. Lower concentrations resulted in fewer instances of anomalous behavior. Water flow induced return to normal behavior patterns in many treated individuals, suggesting that sensory rather than motor components of the nervous system are involved in the DDT effect. Treatment of glass settling with DDT generally resulted in lowered settlement densities of the cyprids of Balanus improvisus and lowered indices of preference for roughened surfaces, indicating that DDT interferes with the cyprid's rugophilic response pattern to settlement surfaces. (Katz)
W74-11293

FREE AMINO ACID VARIATIONS IN THE ANCHOVY, ENGRAULIS MORDAX (GIRARD) FROM THE LOS ANGELES COASTAL AREA,
Immaculate Heart Coll., Los Angeles, Calif. Dept. of Biology.
R. D. Schafer, and E. Swann.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 103-110, 1974. 1 tab, 6 ref.

Descriptors: *Amino acids, *Metabolism, Biochemistry, Water pollution effects, Organic compounds, Methodology, Commercial fish, Animal physiology, Bioassay, *California.
Identifiers: *Engraulis mordax, Auto-analyser, Histidine, *Los Angeles coast(CA).

Difference in free amino-acid content in anchovies was examined to determine the affects of water pollution. Specimens from non-polluted and polluted water were collected by net. White muscle tissue was used for analyses with an auto-analyser and both qualitative and quantitative differences in amino-acid content were noted. Aspartic acid, asparagine and cystine were not present in the controls but were found in one or more of the samples from polluted waters. Histidine was present in the controls in greater quantity than in the test samples. Other quantitative differences were found in taurine, lysine and glutamic acid. (Katz)
W74-11294

THE EFFECT OF HEAVY METAL ON PROTEIN SYNTHESIS IN CRUSTACEANS AND FISH,
Palermo Univ. (Italy). Instituto di Istologia ed Embriologia.
V. D'Amelio, G. Russo, and D. Ferraro.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 111-118, 1974. 3 fig, 13 ref.

Descriptors: *Crustaceans, *Proteins, *Lead, *Heavy metals, Aquatic animals, Water pollution effects, Separation techniques, Analytical techniques, Methodology, Biochemistry, Cytological studies, Metabolism, Isotopic studies.
Identifiers: *Carassius auratus, *Hemoglobin synthesis, *Eriphia spinifrons, *Ribosomes, Hepatopancreas, Aminolevilinic acid dehydrase.

Treatment of Carassius auratus with lead has been found to influence three parameters of blood cells. Hemoglobin synthesis is strongly inhibited, aminolevilinic acid dehydrase activity is reduced and cell density is affected by lead. Eriphia spinifrons was treated with lead and the hepatopancreas was examined for activity and presence of polyribosomes in protein synthesis. After 30 days in the presence of 0.3 mg/l of lead nitrate, polyribosomes were lacking indicating a reduction of protein synthesis. (Katz)
W74-11295

EFFECTS ON HEPATOCYTES IN CELL CULTURES AT VARIOUS COMBINATIONS OF HEAVY METALS PRESENT IN TITANIUM WASTE WATERS, (ACTION SUR DES HEPATOCYTES EN CULTURE HISTIOTYPIQUE, DE DIVERS COMPOSES METALLIQUES PRESENTS DANS LES EAUX RESIDUAIRES DE L'INDUSTRIES DU TITANE),
Paris-5 Univ. (France). Institut d'Histochimie Medicale.
J. Verne, E. Fournier, M. Aubert, S. Hebert, and N. Richshoffer.
In: Revue Internationale d'Oceanographie Medicale, Vol 33, p 147-150, 1974. 2 ref.

Descriptors: *Metals, *Cytological studies, Cadmium, Chromium, *Titanium, *Toxicity, Enzymes, Manganese, Water pollution effects.
Identifiers: Vanadium, Hepatocytes, Mitosis, Cell culture, Titanium industry.

A study was conducted of the behavior of cellular elements in a culture which contained cadmium,

hromium, manganese, titanium and vanadium as hlorides. The cell cultures were made up of epatocytes. Toxicity was determined using the itotic index, the aspect of the cellular organelles nd the enzymic response. The tests evidenced iat cadmium was by far the most toxic metal. oth vanadium and titanium induced significant amage, while the action of manganese and hromium seemed to be very mild. (Katz)
/74-11296

HE USE OF A MOBILE LABORATORY TO TUDY TEMPERATURE RESPONSE OF FISH,
irginia Polytechnic Inst. and State Univ., lacksburg. Dept. of Biology; and Virginia olytechnic Inst. and State Univ., Blacksburg. enter for Environmental Studies.
. S. Cherry, K. L. Dickson, and J. Cairns, Jr.
aper presented at the 29th Purdue Indust. Conf. lay 7-9, 1974. Purdue Univ. Purdue University ngineering Bull. 1 fig, 3 tab, 22 ref.

escriptors: *On site laboratories, On site investigations, *On site tests, Water quality control, emperature, *Thermal pollution, Cooling water, nalytical techniques, Methodology, Movement, ainbow trout, Sunfishes, Bass, Catfishes.
lentifiers: *Acclimation, Salmo gairdneri, reference, Avoidance, Big-mouth chub, Small-outh bass, Northern hogsucker.

he biological assessment of industrial waste ischarges under partly controlled conditions at ie discharge site is becoming increasingly impornt in water quality control. Temperature reference and avoidance trials were conducted ith 16 fish species from six families ranging from lmonids to catfish. Fish were collected near the boratory from heated and unheated areas near ie junction of two rivers receiving thermal efuent from a fossil fuel power plant. Trials were onducted for fish acclimated at temperatures rom 30 to 12C at 3C increments. Preference temeratures decreased for all species as acclimation emperature decreased. Bass, catfish and sunfish referred the warmest temperatures while trout referred the lowest temperatures. Species that ere eurythermal were catfish and sunfish while lmonids were stenothermal. (Katz)
/74-11297

NVESTIGATIONS ON THE TOXICITY OF SEA VATER-EXTRACTS OF THREE CRUDE OILS N EGGS OF COD (GADUS MORHUA L.),
iel Univ. (West Germany). Institut fuer leereskunde.
. W. Kuhnhold.
erichte der Deutschen Wissenschaftlichen Kommission fur Meeresforschung, Vol 23, No 2, p 165-80, 1974. 6 fig, 5 tab, 22 ref.

escriptors: *Toxicity, *Oil, *Embryonic growth tage, Growth stages, Larvae, Mortality, Lethal mit, Organic compounds, Methodology, Sea ater, Water pollution effects.
lentifiers: *Eggs, *Gadus morhua, *Cod, *Crude il, Water-soluble fractions, Embryonic developent, Venezuela crude, Iran crude, Libya crude.

he influence of the water-soluble fractions of ree crude oils to the embryogenesis was tested. ifferent mortality rates resulted from continuous nd short-term exposures. The water soluble fracon was extracted from 2.5, 25 and 250 ml of oil by 5 l seawater, resulting in concentrations of 0.015 o 3.5 ppm of total hydrocarbon. The 48 hour LC50 nd 96 hour LC50 were in the order of 1 to 12 ppm. he broadest spectrum of embryonic abnormalies was observed after exposure of the gastrula tage. The role of distorted, non-viable larvae was igh in certain experiments after treatment of eggs ith crude oils. (Katz)
/74-11298

THE ACCUMULATION AND RETENTION OF 65ZN AND 54MN BY THE PLAICE, PLEURONECTES PLATESSA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
R. J. Pentreath.
Journal of Experimental Marine Biology, Vol 12, No 1, p 1-18, 1973. 5 fig, 9 tab, 25 ref.

Descriptors: *Zinc, *Manganese, *Radioisotopes, Absorption, Retention, Bioassay, Heavy metals, Toxicity, Trophic level, Path of pollutants, Metabolism, Trace elements, Pollutants, Radioactive wastes, Teleosts, Methodology, Water pollution effects.
Identifiers: *Pleuronectes platessa, *Plaice, Biological half-time, Tissue analysis, Blood plasma.

Studies of the uptake and loss of 65Zn and 54Mn by plaice have shown that direct accumulation from water plays only a minor role relative to food in the metabolism of these metals. Accumulation of both isotopes from water was followed at tissue level and their levels of accumulation were related to stable element concentrations. Biological half-times were also calculated for accumulation and loss to water, for loss of activity following an intraperitoneal injection and, using calculations of feeding rate and assimilation of the isotopes, from food. Some comparative studies were carried out with fed and starved fish. Due to the relatively minor role of direct accumulation from water it was considered that the concentrations of these metals would decrease at this trophic level. The relevance of such observations to toxicity testing is also discussed. (See also W74-11300) (Katz)
W74-11299

THE ACCUMULATION AND RETENTION OF 59FE AND 58CO BY THE PLAICE, PLEURONECTES PLATESSA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
R. J. Pentreath.
Journal of Experimental Marine Biology, Vol 12, No 3, p 315-326, 1973. 5 fig, 5 tab, 23 ref.

Descriptors: *Iron, *Cobalt, *Radioisotopes, Absorption, Retention, Heavy metals, Pollutants, Trophic level, Bioassay.
Identifiers: *Plaice, *Pleuronectes platessa, Starvation, Biological half-times.

The accumulation of 59Fe and 58Co from water by plaice has been studied in tissues, and these levels of accumulation related to stable element concentrations. The retention of both radionuclides from labelled Nereis and labelled pellets has also been examined, and the loss of activity from intraperitoneal injections followed over a three month period. Biological half-times of the exchange with water have been calculated for many organs, although the rate of accumulation for some tissues could only be expressed as a linear function; however, for both radionuclides the direct accumulation from water resulted in concentration factors of less than 1% of the values inferred from the stable element data. The relevance of such observations to heavy metal pollution at the higher trophic levels is discussed. (See also W74-11299) (Katz)
W74-11300

THE INFLUENCE OF CERTAIN TOXIC SUBSTANCES, CONTAINED IN DOMESTIC WASTES, ON THE BACTERIA ESCHERICHIA COLI AND PSEUDOMONAS FLOURESCENS, (L'INFLUENCE DE CERTAINES SUBSTANCES TOXIQUES, CONTENUES DANS LES EAUX D'EGOUTS MUNICIPAUX, SUR LES BACTERIES ESCHERICHIA COLI ET PSEUDOMONAS FLOURESCENS),
Institute of Municipal Economy, Poznan (Poland).
S. Spandowska, B. Lubienska, and S. Kolaczkowski.
Swiss Journal of Hydrology, No 2, p 278-285, 1973. 2 fig, 3 tab, 18 ref.

Descriptors: *Municipal wastes, *Escherichia coli, *Pseudomonas, *Toxicity, Waste water(Pollution), Water pollution, Water pollution sources, Water pollution effects, Lethal limit, Growth rates, Phenols, Reproduction, Metabolism, Respiration, Methodology.
Identifiers: Aniline, Pyridine, Chrome.

The toxic influence of phenol, aniline, pyridine and chrome, substances often found in municipal wastewaters, on the bacteria E. coli and P. flourescens was examined. The non-toxic, growth limiting, toxic and lethal doses were determined on the basis of observations made of E. coli and P. flourescens reproduction and respiration patterns. Comparative test series were set up with the various doses in different nutrient cultures to ascertain whether the bacterias' multiplication process or carbohydrate decomposition was more sensitive to the chemicals. (Katz)
W74-11301

EFFECTS OF HEATED EFFLUENT ON HERMATYPIC CORALS AT KAHE POINT, OAHU,
Hawaii Institute of Marine Biology, Honolulu.
P. L. Jokiel, and S. L. Coles.
Pacific Science, Vol 28, No 1, p 1-18, 1974. 10 fig, 4 tab, 23 ref.

Descriptors: *Heated water, *Thermal pollution, *Coral, Benthic fauna, Invertebrates, Marine animals, Reefs, *Hawaii, Power plants, Mortality, Pigments, Discharge(Water), Turbidity, Water pollution sources, Water pollution effects, Benthos, Analytical techniques, Spectrophotometry.
Identifiers: *Hermatypic coral, Pocillopora ssp, Porites ssp.

The effect of thermal enrichment on hermatypic corals was investigated at Kahe Point, Oahu, Hawaii. The reef off the Kahe Power Plant was surveyed before and after an increase in thermal discharge that accompanied plant expansion. Abundances of dead and damaged corals correlated strongly with proximity to plant discharge and with levels of thermal enrichment. Nearly all corals in water 4 degrees to 5 degrees C above ambient were dead. In areas characterized by temperature increases from 2 degrees to 4 degrees C, the corals lost zooxanthellar pigment and suffered high mortality rates. Damage to the corals was most severe in late summer, and conicided with annual ambient temperature maxima. During the winter months the surviving corals slowly regained zooxanthellar pigment, but there was high mortality of corals during the recovery period. (Katz)
W74-11303

THE ACCUMULATION FROM SEA WATER OF 65ZN, 54MN, 58CO AND 59FE BY THE THORNBACK RAY, RAJA CLAVATA L.,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
R. J. Pentreath.
Journal of Experimental Marine Biology, Vol 12, No 3, p 327-334, 1973. 3 fig, 5 tab, 13 ref.

Descriptors: *Zinc, *Manganese, *Iron, *Cobalt, Absorption, Heavy metals, Radioisotopes, Permeability, Sea water, Teleosts, Bioassay, Path of pollutants, Water pollution effects.
Identifiers: *Raja clavata, *Pleuronectes platessa, *Rays(Thornback), Accumulation, Blood plasma, Organ analysis.

The accumulation of 65Zn and 54Mn from water by the thornback ray, R. clavata L., has been studied at tissue level and their levels of accumulation have been related to stable element concentra-

tions. The accumulation of 58Co and 59Fe has also been studied on a whole body basis and comparisons have been made of the 59Fe levels in the tissues after 84 days with those of the stable element. Lower values of accumulation of the radionuclides were obtained than in the case of the teleost Pleuronectesplatessa. Such differences are discussed in relation to the relative permeabilities of the two species to sea water and the relative ratios of the radionuclides from sea water to blood plasma, and of blood plasma to organ. It is concluded that for both species direct input from water plays only a minor role in the accumulation of the four radionuclides studied. (Katz)
W74-11304

EFFECT OF THERMAL EFFLUENT ON MIGRATING MENHADEN,
National Marine Fisheries Service, Highlands, N.J. Sandy Hook Lab.
J. S. Young, and C. I. Gibson.
Marine Water Pollution Bulletin, Vol 4, No 6, p 94-96, 1973. 12 ref.

Descriptors: *Thermal pollution, Water pollution sources, Water pollution effects, Fishkill, Commercial fishing, Cooling water, Heated water, Waste water(Pollution), Migration, *New York, On-site investigations.
Identifiers: *Long Island Sound, *Menhaden, Scubu observation.

Hot water effluent from power stations kill juvenile menhaden migrating through Long Island Sound. Since the fish sink to the bottom, losses are unrecorded or underestimated. Menhaden in Long Island Sound contribute to the commercial fishery off the eastern seaboard of the United States. At present, the losses are small in comparison to the total number of fish migrating through the Sound. In the future, the increasing use of the Sound and other coastal and estuarine waters may have serious consequences for fisheries. (Katz)
W74-11305

MARINE INTERTIDAL COMMUNITY RESPONSES TO KRAFT PULP MILL EFFLUENT,
British Columbia Univ., Vancouver. Dept. of Zoology.
J. R. E. Harger, and M. D. Nassichuk.
Water, Air, and Soil Pollution, Vol 3, No 1, p 107-122, 1974. 4 fig, 4 tab, 22 ref.

Descriptors: *Pulp wastes, *Intertidal areas, *Canada, Industrial wastes, Water pollution sources, Organic wastes, Sessile algae, Aquatic life, Biological communities, Laboratory tests, Diatoms, Benthos, Analytical techniques, Water pollution effects, Water analysis, Water chemistry, Temperature, Hydrogen ion concentration, Mussels, Dissolved oxygen, Trophic level, Littoral.
Identifiers: Mytilus edulis, British Columbia, Balanus ssp, Barnacles.

An attempt was made to evaluate the effects of effluent from a British Columbia kraft pulp mill on sessile marine community structure. Physical oceanographic data coupled with qualitative and quantitative considerations of the intertidal area were evaluated with respect to the implied effects on community structure and diversity. Experiments involved development of diatom communities on glass slides and the subsequent transfer of such communities to and from polluted zones. Changes in experimental community structure occurring as the result of such manipulation were then compared with control communities. The hypothesis of pulp mill effluent having no effect on community structure was rejected. (Katz)
W74-11306

TOXICITY BIOASSAYS OF CADMIUM ON SELECTED FRESHWATER INVERTEBRATES AND THE INTERACTION OF CADMIUM AND ZINC ON THE FRESHWATER SHRIMP, PARATYA TASMANIENSIS RIEK,
Adelaide Univ. (Australia). Dept. of Zoology.
V. J. Thorp, and P. S. Lake.
Australian Journal of Marine and Freshwater Research, Vol 25, No 1, p 97-104, 1974. 2 fig, 3 tab, 23 ref.

Descriptors: *Zinc, *Cadmium, *Toxicity, *Shrimp, Bioassay, Invertebrates, Freshwater, Aquatic animals, Analytical techniques, Laboratory tests, Heavy metals, Lethal limit, Water pollution effects, *Australia, Mine wastes.
Identifiers: South Esk River(Australia), Paratya tasmaniensis, Austrochiltonia subtenius, Atalophlebia australis, Ischnura heterosticta, Leptoceridae ssp.

In acute toxicity bioassays with cadmium sulphate at 15C in soft water, the concentrations fatal to 50% of the test animals were determined for five freshwater invertebrate species. The 96 hr median lethal concentration (LC50) of cadmium was 0.04 mg/l for the amphipod Austrochiltonia subtenuis, 0.06 mg/l for the shrimp Paratya tasmaniensis, 0.84 mg/l for the ephemeropteran nymph Atalophlebia australis, 250 mg/l for the zygopteran nymph Ischnura heterosticta and well over 2000 mg/l for a trichopteran larva of the Leptoceridae. The bioassays on Paratya indicated that there may be seasonal differences in sensitivity to cadmium. The 96 h LC50 for zinc for Paratya was 1.21 mg/l. Zinc and cadmium appeared to interact less than additively at concentrations below 1 toxic unit. Above this concentration, their interaction was strictly additive. (Katz)
W74-11307

SHORT TERM FATE OF DIETARY DIELDRIN IN THE DIGESTIVE TRACT OF JUVENILE LAKE TROUT (SALVELINUS NAMAYCUSH),
National Marine Fisheries Service, Ann Arbor, Mich. Great Lakes Fishery Lab.
D. J. Stewart, and R. A. Stein.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 6, p 563-566, 1974. 1 fig, 9 ref.

Descriptors: *Lake trout, *Dieldrin, *Digestion, Chlorinated hydrocarbon pesticides, Organic compounds, Insecticides, Animal physiology, Laboratory tests, Trout, Methodology, Gas chromatography, Bioassay.
Identifiers: *Salvelinus namaycush.

The short term fate of an oral dose of dieldrin in the digestive tract of lake trout was examined by injecting food contaminated with about 1.05 ppm of dieldrin directly into the stomach. Trout were sacrificed at intervals to determine the location of dieldrin in the gut. The decline of dieldrin in the stomach paralleled the decline in the amount of food and little or no dieldrin was found in the intestine. This indicates a rapid uptake or degradation of dieldrin in the pyloric caecal region and demonstrated, under these experimental conditions, that defacation of dieldrin is minimal. (Katz)
W74-11308

RESISTANCE AND RESPIRATORY PHYSIOLOGY OF INTERTIDAL MEIOFAUNA TO OXYGEN-DEFICIENCY,
Bordeaux Univ., Arcachon (France). Inst. of Marine Biology.
P. Lasserre, and J. Renaud-Mornant.
Netherlands Journal of Sea Research, Vol 7, p 290-302, 1973. 3 fig, 1 tab, 33 ref.

Descriptors: *Habitats, *Metabolism, *Oxygen, Lethal limit, Methodology, Oxygen requirements, Hydrogen sulfide, Animal physiology, Adaptation.
Identifiers: *Meiofauna, Hesionides ssp, Stygocapitella ssp, Protodriloides ssp, Stenoxybionic, Euroxybionic.

The resistance and oxygen consumption of six meiofauna groups living in semistable or oceanic sandy beaches were studies in relation to oxygen-deficiency. Under laboratory conditions the 6 groups examined (2 polychaetes, 1 oligochaete, 1 archiannelid, 1 mystacocarid, and 1 harpacticoid copepod) show a high sensitivity to hydrogen sulfide and an intolerance to a low ambient oxygen (below 0.5 ml O2/1). Above this critical limit they are more tolerant and different groups are considered either stenoxybiontic or euroxybiontic. A distinction between metabolic regulators and metabolic conformers is made for some species. Others have complex metabolic rates. The euroxybiontic regulators show highest tolerance to low oxygen tension which enables these species to live at a high level of the sandy beach, an oxygen deficient habitat. Stenoxybionic conformers require a fully oxidized biotope found in the 'high energy beach'. (Katz)
W74-11309

EFFECT OF WATER HARDNESS ON THE TOXICITY OF AN ANIONIC DETERGENT TO FISH,
Unilever Ltd., Sharnbrook (England). Unilever Research Lab.
P. W. A. Tovell, C. Newsome, and D. Howes.
Water Research, Vol 8, No 5, p 291-296, 1974. 5 fig, 8 ref.

Descriptors: *Toxicity, *Detergents, *Anions, *Hardness(Water), Water properties, Absorption, Cations, Trout, Rainbow trout, Isotope studies, Methodology.
Identifiers: *Sodium lauryl sulphate, Goldfish, Salmo gairdneri, Carassius auratus, Tissue uptake, Soft water, Survival times, Sodium ion, Potassium ion, Magnesium ion, Calcium ion.

The toxicity to fish of anionic detergents in solution varies according to the hardness of the water in which the fish are treated. Trout and goldfish are more susceptible to sodium lauryl sulphate (SLS) in hard water than soft, and the rate of absorption of detergent is greater in hard water. It has been shown that the concentration of bivalent cations has a direct effect on the toxicity of SLS. Acclimatization experiments have shown that the toxicity of SLS depends on both the hardness of the water in which the fish was treated and the hardness of the water in which the fish was acclimatized. The mechanism whereby water hardness affects detergent toxicity is discussed. (Katz)
W74-11310

LEAD UPTAKE FROM SEA WATER AND FOOD, AND LEAD LOSS IN THE COMMON MUSSEL MYTILUS EDULIS,
Institut fuer Meeresforschung, Bremerhaven (West Germany).
M. Schulz-Baldes.
Marine Biology, Vol 25, No 3, p 177-193, 1974. 7 fig, 4 tab, 27 ref.

Descriptors: *Mussels, *Lead, *Absorption, Molluscs, Marine animals, Bioassay, Bioindicators, Sea water, Water pollution, Metals, Heavy metals, Food chains, Methodology, Laboratory tests, Spectrophotometry, Analytical techniques, Statistical models.
Identifiers: *Mytilus edulis, *Kidney, Lead loss.

Common mussels were maintained for 6 weeks in sea water containing different concentrations of lead (0.005 to 5 mg/l). The lead concentration in the mussels' whole soft parts was analysed at different times during the experiment. A constant rate of lead uptake, linearly dependent on the lead concentration of the medium, was observed. Rate of lead loss, measured after transferring the mussels into natural sea water, is linearly dependent on the orginal lead concentration in the soft parts. Rates of uptake and loss in large mussels are less than those in small mussels. Adjustment to a steady state is expected to occur in a more ex

ended experimental period. Lead uptake by individual organs of large M. edulis was analysed in test series. Rates of uptake varied in all organs; ne kidney displayed the highest rate. With these hysiological properties M. edulis is an ideal indicator organism for lead pollution in the marine nvironment. (Katz)
/74-11311

KEROSENE-LIKE TAINT IN THE SEA MULET, MUGIL CEPHALUS (LINNAEUS) I. COMOSITION AND ENVIRONMENTAL OCCURENCE OF THE TAINTING SUBSTANCE,
epartment of Primary Industries, Hamilton, Australia). Sandy Trout Food Preservation esearch Lab.
. W. Connell.
ustralian Journal of Marine and Freshwater esearch, Vol 25, No 1, p 7-24, 1974. 8 fig, 24 ref.

escriptors: *Mullets, *Absorption, Chemical nalysis, Bioassay, Australia, Marine fish, Comercial fish, Sediments, Hydrocarbons, Taste, dor, Organoleptic properties, Analytical chniques, Gas chromatography, Spectrometry, pawning.
dentifiers: *Taint, Kerosene, Mugil cephalus.

kerosene-like taint in sea mullet from south ueensland has been found to be due to a mixture f hydrocarbons closely resembling commercial erosene in composition. Similar substances were olated from sediments in certain areas of the risbane River and from effluents discharging into ne of these areas. Hydrocarbon-containing sedients, consumed with food, were found in the gut f tainted sea mullet and are believed to cause erosene-like tainting in the flesh. The presence of ydrocarbons in river water indicates the possibili- of absorption through the gills. Tainted fish om the Brisbane River possibly join untainted sh from other rivers in the winter spawning run. his would explain the capture of tainted fish, gether with untainted fish, during the winter hen commercial mullet fishery is at its peak. Katz)
/74-11312

HE COMBINED EFFECT OF HIGH SALINITY ND TEMPERATURE ON THE SURVIVAL OF OUNG LIMANDA LIMANDA,
eeds Univ. (England). Wellcome Marine Lab.
. Lowthion.
larine Biology, Vol 25, No 3, p 169-174. 4 fig, 3 ab, 16 ref.

escriptors: *Salinity, *Temperature, *Time, Vater pollution sources, Mortality, Seasonal, tatistical models, Methodology, Analytical chniques, Commercial fish, Marine fish, Larvae, esistance.
dentifiers: *Limanda limanda, Brine, Responseurface analysis, Median survival time, *Dabs.

oung specimens of the dab, Limanda limanda Linnaeus) in the area of a proposed concentrated rine discharge off the Yorkshire coast were subected to high salinities over temperatures corsponding to an annual temperature range. The sults of these experiments have been used in the sign of a dilution and dispension system to proct the inshore fisheries. Mortality was found to e size dependent, smaller dabs being least restant. The effect of temperature slowly declines ith increased immersion time, and salinity ecomes increasingly the more dominant effect. A -dimensional response-surface model of the morlity contours, for salinity, temperature, and imersion time, was produced which may be used to et upper limits to the design of the effluent isposal system. It is concluded that significant hanges in the L. limanda populations will not ccur, provided salinity does not rise above 55%. Katz)
/74-11314

THE TOXICITY OF SOME FORMS OF COPPER TO RAINBOW TROUT,
Water Pollution Research Lab., Stevenage (England).
T. L. Shaw, and V. M. Brown.
Water Research, Vol 8, No 6, p 377-382, 1974. 1 fig, 4 tab, 10 ref, append.

Descriptors: *Copper, *Toxicity, *Rainbow trout, Trout, Hardness(Water), Copper compounds, Methodology, Lethal limit, Laboratory tests, Water pollution effects, Hydrogen ion concentration.
Identifiers: *Copper carbonate, Nitrilotriacetic acid, Organo-copper complex, pH effects, Neutralized NTA, Analytical methods, Cupric copper.

The lethal toxicity of copper to rainbow trout in hard water was found to be related to the total concentration at which soluble copper, Cu2+, and CuCO3, was present in the water, rather than to the concentration of either of these two forms alone. It is suggested that, except in the presence of highly toxic organo-copper compounds, from a knowledge of the cupric ion concentration, the pH, and the alkalinity of the water, the total concentration of soluble copper can be calculated and hence the toxicity of that water determined. (Katz)
W74-11315

DETERMINATION OF THE HEMATOCRIT VALUE OF CARP AND ITS INFLUENCING WITH COBALT, (STANOVENI HEMATODRITOVE HODNOTY KAPRU A JEJI OVLIVNENI KOBALTEM),
Vyzkumny Ustav Rybarsky and Hydrobiologicky, Vodnany (Czechoslovakia).
J. Havelka.
Zivousna Vyroba (Praha), Vol 15, No 7-8, p 489-496, 1970. 39 ref.

Descriptors: *Fish management, *Carp, *Cobalt, *Fish physiology, Fish disease, Trace elements, Analytical techniques, Methodology, Respiration, Seasonal, Fish populations, Metals, Chemcontrol.
Identifiers: *Intensive carp breeding, *Hematocrit, Cobalt dichloride, Infectious dropsy, Disease resistance, Hemoglobin, Disease prevention.

In intensive carp culture, cobalt dichloride (CoCl2) is added to the diet to inhibit diseases, particularly infectious dropsy. Cobalt favorably affects blood physiology, increases respiration capacity and improves disease resistance of carp. The use of the hematocrit test to evaluate carp culture procedures is advocated. (Katz)
W74-11316

ECOLOGICAL STUDIES IN ARTIFICIAL STREAMS. III. THE SEASONAL CHANGE IN THE RELATIONSHIP OF HETEROTROPH TO PHOTOTROPHIC BIOMASSES IN DIFFERENT SEWAGE CONCENTRATIONS, (OKOLOGISCHE UNTERSUCHUNGEN AN MODELLFLIESSGEWASSERN. III. DIE JAHRESZEITLICHEN VERANDERUNGEN IM VERHALTNIS VON HETEROTROPHER ZU PHOTOTROPHER BIOMASSE BET VERSCHIEDENEN ABWASSERBLASTUNGEN),
Eidgenossische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewasserschutz, Zurich (Switzerland).
E. Eichenberger.
Swiss Journal of Hydrology (Schweizerische Zeitschrift fur Hydrologie), Vol 34, No 2, p 155-172, 1972. 8 fig, 2 tab, 19 ref.

Descriptors: *Biomass, *Seasonal, Benthos, *Sewage, Chlorophyll, *Primary productivity, Productivity, Biological communities, Ecological distribution, Bacteria, Sphaerotilus, Model studies.
Identifiers: *Heterotrophs, *Phototrophs.

The seasonal changes of the biomass production of benthic microphytes were investigated in outdoor channels for the first 20 days of colonization. The channels were fed with groundwater to which up to 12% settled sewage was added as pollutant. Chlorophyll content of the total biomass allowed estimation of the heterotrophic and phototrophic portions of the total growth. Addition of 12% sewage caused an increase of the heterotrophic biomass at a constant rate for the first 3 to 4 weeks. For each season tested the heterotrophic growth is proportional to the sewage concentration within the range of 0 to 12%. Best phototrophic growth occurs in summer in 1 to 5% sewage. Heterotrophic microphytes find better conditions in winter. (See also W74-11318) (Katz)
W74-11317

ECOLOGICAL STUDIES IN ARTIFICIAL STREAMS. IV. SELF PURIFICATION AND BIOMASS PRODUCTION IN A DOMESTIC SEWAGE GRADIENT, (OKOLOGISCHE UNTERSUCHUNGEN AN MODELLELIESSGEWASSERN. IV. AUSWIRKUNG DER SELBSTEINIGUNG AUF DIE BIOMASSEBILDUNG IN EINEM ABWASSERGRADIENTEN),
Eidgenossische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewasserschutz, Zurich (Switzerland).
E. Eichenberger.
Swiss Journal of Hydrology (Schweizerische Zeitschrift fur Hydrologie), Vol 34, No 2, p 173-189, 1972. 2 fig, 5 tab, 22 ref.

Descriptors: *Benthos, *Sewage, *Biomass, *Self-purification, Primary productivity, Water pollution, Algae, Biological communities, Benthic flora, Artificial watercourses, Model studies.
Identifiers: *Phototrophs, *Heterotrophs, Nitzschia, Test streams.

The benthic growth was investigated during the first 20 days of colonization in 200 m long river models polluted with 0, 1, 5 and 12% settled domestic sewage. The productions of phototrophic and heterotrophic biomass were determined at the beginning, middle and end of the channels. An equation for the distribution of the heterotrophic biomass is described. The phototrophs do not significantly contribute to the removal of growth substrates utilized by the heterotrophs. Different pollution loads in locations containing identical heterotrophic biomass produce markedly different biomass and species composition in phototrophic growth. Concentration change of pollutants in sewage through dilution or biochemical reactions induces different biocenological effects. (See also W74-11317) (Katz)
W74-11318

DISTRIBUTION OF TOTAL MERCURY IN THE FISHES OF LAKE OAHE,
Environmental Protection Agency, Kansas City, Kans. Region VII.
For primary bibliographic entry see Field 5B.
W74-11319

OXYGEN CONSUMPTION AND ACTIVITY OF THE WHITE SUCKER (CATOSTOMUS COMMERSONI), IN LETHAL AND NONLETHAL LEVELS OF THE ORGANOCHLORINE INSECTICIDE, METHOXYCHLOR,
Queen's Univ., Kingston (Ontario). Dept. of Biology.
K. G. Waiwood, and P. H. Johansen.
Water Research, Vol 8, No 7, p 401-406, 1974. 5 fig, 29 ref.

Descriptors: *Suckers, *Oxygen demand, *Lethal limit, *Insecticides, *Chlorinated hydrocarbon pesticides, Bioassay, Methodology, Respiration, Movement, Continuous flow, Toxicity.
Identifiers: Survival, *Activity, *Methoxychlor, *Sublethal effects, *Catostomus commersoni, Ethanol.

The survival, oxygen consumption and spontaneous activity of suckers were determined at 15 C in water containing different concentrations of methoxychlor in ethanol, ethanol, and no added substances. A dynamic bioassay was used to estimate the 96 h LC50, which was found to be 0.0345 ppm. After 24 h fish exposed to untreated, ethanol-treated and 0.01 ppm methoxychlor-treated water had oxygen uptake rates which were relatively constant and near standard levels. At 0.10 ppm methoxychlor (lethal to all fish within 85 h) oxygen consumption rates were 2-3.5 times as high as those of control fish and activity was greatly increased. The fish lost their balance and the coordination between opercular and locomotor movements. The increase in ventilation that accompanies this hyperactivity may result in increased uptake of insecticide and thereby explain the irreversible nature of the response. (Katz)
W74-11320

THE TOXICITY OF ZINC SULPHATE TO RAINBOW TROUT IN VERY HARD WATER,
Water Pollution Research Lab., Stevenage (England).
J. F. de L. G. Solbe.
Water Research, Vol 8, No 6, p 389-391, 1974. 1 fig, 3 tab, 12 ref.

Descriptors: *Toxicity, *Zinc, *Hardness(Water), *Rainbow trout, Trout, Water quality, Freshwater, Methodology, Analytical technique, Absorption, Hydrogen ion concentration, Lethal limit.
Identifiers: *Zinc sulphate.

Experimentation to determine the toxicity of zinc to rainbow trout in very hard water was performed. The pH of the water directly influences the concentration of dissolved zinc and thus the toxicity. The relation between 48-hour LC50 and the hardness of water that was previously determined for lower values of hardness was also found to apply to an average total hardness of about 500 mg/l as CaCO3. Fish survived longer in harder water and in higher pH water. (Katz)
W74-11321

NUMERICAL INDICES APPLIED TO THE RESULTS OF A SURVEY OF THE MACRO-INVERTEBRATE FAUNA OF THE TAMAR CATCHMENT (SOUTHWEST ENGLAND),
Cornwall River Authority, Launceston (England).
For primary bibliographic entry see Field 5B.
W74-11322

CHLORINATED INSECTICIDE RESIDUES IN THE EGGS OF SOME FRESHWATER FISH,
Iowa Univ., Iowa City. State Hygienic Lab.
L. G. Johnson, and R. L. Morris.
Bulletin of Environmental Contamination and Toxicity, Vol 11, No 6, p 503-510, 1974. 2 fig, 2 tab, 8 ref.

Descriptors: *Pesticides, *Fish eggs, *Dieldrin, *Freshwater fish, Insecticides, Water pollution sources, Water pollution effects, Bioassay, Bioindicators, Absorption, *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticide, Separation techniques, Analytical techniques, *DDT, *Aldrin, *Heptachlor, Catfishes, Bass.
Identifiers: *Chlordane, *Flonsil.

Measurements of pesticides in various tissues of fish indicates the extent of the relative pollution of a river. Fish eggs were studied because of the wide variation in pesticide contents in the flesh of different catfish species in Iowa. Dieldrin was the major insecticide residue detected in the eggs and the highest levels were found in eggs from those locations where the highest concentrations were determined in fish flesh and water samples. Eggs of the Walleye had the highest lipid and dieldrin content and catfish had the lowest, with eggs of the largemouth bass between. Little information is available on the effect on reproduction of dieldrin in fish eggs. (Katz)
W74-11323

ACUTE TOXICITY OF UNBLEACHED KRAFT MILL EFFLUENT (UKME) TO THE OPOSSUM SHRIMP, NEOMYSIS AMERICANA SMITH,
Virginia Inst. of Marine Science, Gloucester Point.
F. Jacobs, and G. C. Grant.
Water Research, Vol 8, No 7, p 439-445, 1974. 1 fig, 5 tab, 28 ref.

Descriptors: *Pulp wastes, *Toxicity, *Shrimp, Bioassay, *Biochemical oxygen demand, Methodology, Statistical models, Dissolved oxygen, Water pollution effects.
Identifiers: *Opossum shrimp, *Neomysis americana, Sublethal limit, Detoxification.

The 96 hour TL50 values of unbleached kraft mill effluent (UKME) for N. americana were found to range from 3.29-6.85 per cent at 26-28C and 3.90-7.30 per cent at 16-18C. UKME did not lose its toxicity when stored at 4C for 5-7 days. A concentration of 20 per cent effluent killed 100% of the organisms in 8 of the 12 bioassays. Slope functions and confidence limits of TL50 were calculated. Toxicity did not appear to be correlated with the Biological Oxygen Demand (BOD) of individual batches of raw effluent. (Katz)
W74-11324

ECOLOGICAL IMPLICATIONS OF HEAVY METAL IN FISH FROM THE SEVERN ESTUARY,
Bath Univ. (England).
M. W. Hardisty, R. J. Huggins, S. Kartar, and M. Samsbury.
Marine Pollution Bulletin, Vol 5, No 1, p 12-15, January, 1974. 2 tab, 15 ref.

Descriptors: *Heavy metals, Path of pollutants, Food chains, Lead, Cadmium, Zinc, Shrimp, Teleosts, Bioassay, Snail, Spectrophotometry, Environmental effects, Seasonal, Age, Absorption, Lampreys.
Identifiers: *Flounder, *Platichthyes flesus, Pomatoschistus minutus, Liparis liparis, Lampetra ssp, Gobies.

Tissues and organs of the flounder collected from the Severn at Oldbury, in the course of a year long survey, were analysed for lead, cadmium and zinc. Differences were noted in the level of zinc deposition in the various age groups of this teleost, particularly in autumn and summer. To explain these results, the feeding habits of the flounder were studied and heavy metal analyses were conducted on some of its principal foodstuffs and related animals. (Katz)
W74-11325

CONTINUOUS-FLOW BIOASSAYS WITH AQUATIC ORGANISMS: PROCEDURES AND APPLICATIONS,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5A.
W74-11326

ICHTHYOTOXIC EFFECTS OF SOME ANTI-POLLUTION PRODUCTS,
Laboratorio Provinciale di Igiene e Profilassi, Genoa (Italy); and Genoa Univ. (Italy). Istituto di Farmacologia e Farmacognosia.
I. Baldini, and F. Cugurra.
Water Research, Vol 8, No 5, p 323-324, 1974. 1 tab, 2 ref.

Descriptors: *Toxicity, *Pollution abatement, Fishkill, Laboratory tests, Water pollution control, Hydrocarbons, Oil pollution.
Identifiers: *Antipollution products, *Ichthyotoxicity, Carassius auratus, Esso Corexit, Goldfish.

A study has been carried out on the toxic effects of 14 anti-pollution products used for the dispersion of hydrocarbons in water, on Carassius auratus. The better tolerated products are ESSO Corexit 8666 and 7664; followed by Fina Sol OSR/2 and SC while the other products were found to contain higher ichthyotoxicity characteristics. Both fresh and seawater were used in the experiment. (Katz)
W74-11327

INFLUENCE OF SALINITY AND IONIC EQUILIBRIUM ON THE CONTAMINATION OF ARENICOLA MARINA L. (ANNELIDE: POLYCHEATE) BY CESIUM-137, (INFLUENCE DE LA SALINITE ET DE L'EQUILIBRE IONIQUE SUR LA CONTAMINATION D'ARENICOLA MARINA L. (ANNELIDE: POLYCHETE) PAR LE CAESIUM-137.),
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Service des Recherches Toxicologiques et Ecologiques; and Institut des Sciences de la Nature, Nantes (France). Laboratoire d'Ecologie Animale et Biologie Marine.
C. Amiard-Triquet.
Journal of Experimental Marine Biology and Ecology, Vol 15, No 2, p 159-164, 1974. 1 tab, 11 ref.

Descriptors: *Cesium, *Phaeophyta, *Annelids, *Salinity, Worms, Ions, Absorption, Potassium, Radioisotopes, Bioassay, Adsorption, Equilibrium, Water pollution effects.
Identifiers: *Arenicola marina.

The fixation of 137Cs on fine sand by Arenicola increases when the salinity or K content of water is decreased. The concentration factors for sea water diluted to 60% or with a K level of 50% were twice those for normal sea water, except for the coelomic fluid, the concentration factor of which remained constant. Several assumptions can explain the process: (1) a weaker competition between ions at the lower concentrations; (2) substitution of potassium by cesium; (3) parallel contribution of Cs and K in maintaining a more hypertonic internal environment; and (4) contamination via the food chain in desalinated sea water. (Katz)
W74-11328

HEAVY METAL TOLERANCE OF MARINE PHYTOPLANKTON. I. THE TOLERANCE OF THREE ALGAL SPECIES TO ZINC IN COASTAL SEA WATER,
Norwegian Inst. of Seaweed Research, Trondheim.
A. Jensen, B. Rystad, and S. Melsom.
Journal of Experimental Marine Biology and Ecology, Vol 15, No 2, p 145-157, 1974. 2 fig, 3 tab, 27 ref.

Descriptors: *Zinc, *Algae, *Dialysis, *Toxicity, Diatoms, Aquatic plants, Phytoplankton, Resistance, Laboratory tests, Growth rates, Spectrometry, Methodology, Bioassay, Heavy metals, Bioindicators, Monitoring, Water pollution effects.
Identifiers: *Sublethal effects, *Skeletonema costatum, *Thalassiosira pseudonana, *Phaeodactylum tricornutum.

Tolerance levels to zinc ions of three diatoms grown in dialysis culture in the local fjord water were studied. Declining relative growth rates were observed by addition of 50, 250, and 25,000 micrograms/l of zinc ions, to Skeletonema costatum, Thalassiosira pseudonana, and Phaeodactylum tricornutum, respectively. Reduced final cell concentrations were found at lower zinc levels. A significant increase in zinc uptake at zinc levels that did not seem to influence growth and development took place in at least one species of algae. Two clones of S. costatum showed significant intraspecific differences regarding the tolerance to zinc pollution. Dialysis bioassay was found suit

ole for monitoring heavy metal pollution of aquatic ecipients. (Katz)
W74-11329

METHYLMERCURY EXPOSURE, MERCURY LEVELS IN BLOOD AND HAIR, AND HEALTH TATUS IN SWEDES CONSUMING CONTAMINATED FISH,
National Swedish Food Administration, Stockholm. Dept. of Food Research.
For primary bibliographic entry see Field 5B.
W74-11330

HEXACHLOROBENZENE (HCB) RESIDUES IN FISH,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
L. L. Johnson, D. L. Stalling, and J. W. Hogan.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 393-398, 1974. 1 fig, 2 tab, 16 ref.

Descriptors: *Fungicides, *Organic compounds, Gas chromatography, Mass spectrometry, Freshwater fish, Anadramous fish, Bioassay, Separation techniques, Salmonids, Trout, Bass, Catfishes.
Identifiers: *Hexachlorobenzene.

Hexachlorobenzene residues found in freshwater and anadromous fish, fish eggs, fry and oil are reported. Samples were collected throughout the United States. HCB is used as a fungicide and in organic synthesis and little is known about its biological impact. Specific sources of HCB contamination in the environment are unknown. (Katz)
W74-11331

EFFECTS OF CRUDE OIL ON THE FEEDING BEHAVIOR OF THE LOBSTER HOMARUS AMERICANUS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
A. Atema, and L. S. Stein.
Environmental Pollution, Vol 6, No 2, p 77-86, 1974. 1 fig, 4 tab, 11 ref.

Descriptors: *Oil, *Lobsters, *Behavior, *Feeding rates, Oil spills, Invertebrates, Shellfish, Water pollution effects, Laboratory tests, Methodology, Microscopy, Hydrocarbons, Gas chromatography.
Identifiers: *Sublethal effects, *Feeding behavior, Homarus americanus, La Rosa crude oil.

Small quantities of crude oil (oil-seawater ratio of 1:100,000) interfered with specific, possibly chemosensory behavior of the lobster, Homarus americanus. In their feeding behavior the period between noticing food and going after it doubled following the addition of oil. In contrast, the water-soluble fraction of this same amount of crude oil had no noticeable effects on chemosensory and feeding behavior. No morphological changes in odor receptors after oil exposure were detected by light and electron microscopy. Chemical analyses showed that the original lipid concentration of water drops when brought in contact with an oil slick. Over a five-day period the oil degraded in seawater. Results suggest that small quantities of whole oil mixed into seawater constitute a noxious smell to the lobster, depressing appetite and chemical excitability and increasing the time taken to find food. (Katz)
W74-11333

THE UTILIZATION OF A SIMPLE EXPERIMENTAL DEVICE FOR STUDY OF WATER POLLUTION IN SITU: COMPARATIVE EFFECTS OF THREE ANTI-PETROLEUM EMULSIFYING AGENTS,
Museum National d'Histoire Naturelle, Paris (France). Laboratoire de Physiologie Generale et Comparee.
J. C. Lacaze.
Tethys. Vol 3, No 4, p 705-715, 1971. Illus. English summary.

Descriptors: *Analytical techniques, Photosynthesis, Chlorophyll, Emulsions.
Identifiers: Corexit, Gamosol, Sefoil.

By establishing in situ experimental ecosystems, pollution research under actual conditions was conducted. The experiment was carried out in an oyster culture basin of a lagoon in the region of Sables d'Olonne (France) by using devices to section off the water into a number of similar natural environmental compartments to be used for pollutant treatments and controls. Each device which isolated 560 liters of water consisted of a polyethylene sheath equipped with 60 cm diameter polyvinyl chloride rings. Floats were attached to the upper rings while the lower ones were weighted and became buried in the sand. Except for the controls, each of these experimental ecosystems received a pollutant at the rate of 40mg/l in the form of an anti-petroleum product. The criteria used to illustrate the effects of pollution were: photosynthetic activity; concentration of chlorophyll a; dry weight of the plankton. The product Corexit produced only weak and temporary changes. Sefoil acted as a fertilizer, provoking a rapid increase in photosynthesis and chlorophyll a concentration; this was followed by considerable growth in the zooplankton, particularly of the copepods which caused the disappearance of the phytoplankton by the end of the experiment. The surface-active fraction of the third product used, Gamosol, caused an almost complete inhibition of photosynthesis during the whole of the 15 day experimental period.--Copyright 1974, Biological Abstracts, Inc.
W74-11334

POLYCHLORINATED BIPHENYLS AND P,P' DDE IN GREEN TURTLE EGGS FROM ASCENSION ISLAND, SOUTH ATLANTIC OCEAN,
Florida Univ., Gainesville. Dept. of Food Science.; and Florida Univ., Gainesville. Dept. of Zoology.
N. P. Thompson, P. W. Rankin, and D. W. Johnston.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 399-406, 1974. 3 fig, 1 tab, 15 ref.

Descriptors: *Polychlorinated biphenyls, *DDT, *Turtles, Arochlor, DDD, DDE, Gas chromatography, Separation techniques, Marine animals, Methodology, Path of pollutants, Atlantic Ocean.
Identifiers: *Ascension Island(South Atlantic Ocean), *Chelonia mydas, *Eggs.

Industrial pollutants have become widely distributed in global ecosystems, as have persistent pesticides. Ascension Island, one of the most isolated islands in the South Atlantic Ocean, is utilized by sea birds and turtles (especially the marine pelagic Green Turtle, Chelonia mydas) for breeding. Bird and turtle eggs were sampled for PCB and pesticide analyses. These turtles provide protein for human populations throughout the range of species involved. Gas chromatography of the contents of turtle eggs evidenced PCB's as well as p,p'DDE, DDD, and DDT. Several arochlor compounds were found also. It is apparent that these pesticides were obtained from organisms eaten en route to Ascension Island, in the relatively unpolluted waters of the western South Atlantic Ocean. No concrete information on possible effects on the organism is available. (Katz)
W74-11335

TRACE METALS IN LAKE CAYUGA LAKE TROUT (SALVELINUS NAMAYCUSH) IN RELATION TO AGE,
Corning Glass Works, N.Y. Research and Development Lab.
S. S. C. Tong, W. D. Youngs, W. H. Gutenmann, and D. J. Lisk.
Journal Fisheries Research Board of Canada, Vol 31, No 2, p 238-239, 1974. 1 tab, 5 ref.

Descriptors: *Trace elements, *Chromium, *Lake trout, *Age, Molybdenum, Tin, Trout, Bioassay, Mercury, Analytic technique, Mass spectrometry, Absorption, *New York.
Identifiers: *Fish age, Rhodium, Methyl mercury, *Lake Cayuga(NY), Accumulation, Aluminum, Antimony, Arsenic, Barium, Boron, Cadmium, Cesium, Cobalt, Copper, Gallium, Germanium, Indium, Iron, Lead, Manganese, Nickel, Niobium, Palladium, Praseodymium, Rubidium, Ruthenium, Silicon, Silver, Strontium, Tellurium, Terbium, Thulmium, Titanium, Tungsten, Vanadium, Yttrium, Zinc, Zirconium.

Concentrations of trace metals in lake trout were investigated in relationship to fish age. Chromium concentration increased and molybdenum and tin concentrations decreased in Lake Cayuga lake trout from age 1 to 12 years. The concentration of rhodium ranged from about 100 to 200 ppb. The concentrations of 33 other trace metals in the fish are reported. The concentrations of most metals in lake trout are apparently not related to the age of the fish. (Katz)
W74-11336

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO ESTUARINE SEDIMENTS CONTAINING HIGH CONCENTRATIONS OF ZINC AND CADMIUM,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
G. W. Bryan, and L. G. Hummerstone.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 4, p 839-857, November 1973. 11 fig, 6 tab, 18 ref.

Descriptors: *Zinc, *Cadmium, *Adaptation, Sediments, *Estuaries, Absorption, *Bioassay, Worms, Environmental effects, Water pollution sources, Toxicity, Analytical technique, Methodology, Isotope studies, Adsorption, Resistance, Salinity.
Identifiers: *Nereis diversicolor, *Polychaetes, *United Kingdom(England).

Concentrations of zinc and cadmium in N. diversicolor have been compared with those of sediments in the estuaries of 26 rivers. The concentrations of zinc in sediments varied by a factor of 30, from 100 to 3000 micrograms/g while the concentrations in worms varied by a factor of only 2.7 from 130 to 350 micrograms/g dry weight. Concentrations of cadmium in the sediments varied by a factor of 46 from about 0.2 to 9.3 micrograms/g and concentrations in the worms were roughly proportional to them and varied by a factor of 45 from 0.08 to 3.6 micrograms/g. These results suggest that zinc is regulated by the worm whereas cadmium is not. Some factors which influence the absorption of heavy metals are discussed and the adaptation of Nereis to high concentrations of metals is compared with that of other organisms. (See also W74-11338) (Katz)
W74-11337

ADAPTATION OF THE POLYCHAETE NEREIS DIVERSICOLOR TO MANGANESE IN ESTUARINE SEDIMENTS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
G. W. Bryan, and L. G. Hummerstone.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 4, p 859-872, November 1973. 5 fig, 4 tab, 13 ref.

Descriptors: *Manganese, Absorption, Metals, Sediments, Isotope studies, Analytical techniques, Salinity, *Estuaries, *Bioassay, Worms, Seasonal.
Identifiers: *Nereis diversicolor, *Polychaetes, Interstitial water, Isotopic exchange, United Kingdom(SW England).

Concentrations of manganese have been measured in Nereis diversicolor, interstitial water and sediments from estuaries draining the mineralized areas of South-West England. Results from the field observations were supported by experiments using 54Mn. Manganese appears to occur in Nereis in two pools, one exchanging slowly and the other more rapidly. The slowly exchanging pool amounts to roughly 10 micrograms/g on a dry-weight basis and upon this is superimposed the more rapidly exchanging pool, the magnitude of which depends on several factors. The two most important of these are the concentration of manganese in the interstitial water and salinity. With decreasing salinity the concentration factor for manganese increases, and therefore the highest concentrations of manganese are usually found in animals from the least saline areas of an estuary. (See also W74-11337) (Katz)
W74-11338

QUALITATIVE STUDIES ON THE METABOLISM OF NAPTHALENE IN MAIA SQUINADO (HERBST),
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
E. D. S. Corner, C. C. Kilvington, and S. C. M. O'Hara.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 4, p 819-832, November 1973. 2 fig, 5 tab, 22 ref.

Descriptors: *Metabolism, *Crabs, *Organic compounds, Food chains, Urine, Animal metabolism, Biochemistry, Aromatic compounds, Methodology, Analytical techniques, Separation techniques, Spectrophotometry, Chemistry.
Identifiers: *Naphthalene, *Maia squinado, 1,2-dihydro-1,2-dihydroxynaphthalene, 1-naphthyl sulphate, 1-naphthyl glucoside, 1-naphthylmercapturic acid, 1-naphthol, Enzyme hydrolysis, Spectrophotofluorometry.

Extraction methods, paper chromatography, enzyme hydrolysis and spectrophotofluorometry were used in identifying unchanged naphthalene and several metabolites of the compound in the urine of Maia squinado (Herbst) that was dosed with the aromatic hydrocarbon napthalene. Unchanged napthalene was not expected in the urine as this has not been observed in studies of other species. Other metabolites were identified in the urine of Maia dosed with 1-naphthol. (Katz)
W74-11339

THE GROWTH KINETICS OF ISOCHRYSIS GALBANA IN CULTURES CONTAINING SUBLETHAL CONCENTRATIONS OF MERCURIC CHLORIDE,
Marine Biological Association of the United Kingdom, Plymouth (England).
A. B. Davies.
Journal of the Marine Biological Association of the United Kingdom, Vol 54, No 1, p 157-169, February 1974. 8 fig, 2 tab, 23 ref.

Descriptors: *Mercury, *Phytoplankton, *Kinetics, *Growth rates, Heavy metals, Absorption, Adsorption, Methodology, Toxicity, Lethal limit, Separation techniques, Cytological studies, Biochemistry.
Identifiers: *Mercuric chloride, *Isochrysis galbana.

Measurements of the effect of mercuric chloride upon the growth of Isochrysis galbana in culture are reported. The mercury was concentrated by the plant cells to a very high level. It is shown that the specific growth rate of the cells in the presence of mercury was reduced linearly by increasing intracellular levels of the metal. The intracellular concentration which just prevented growth (about 2g/l) was not instantly lethal and chemical removal of the mercury allowed growth to start again and achieve population levels approaching those of the control. The presence of mercury in the cells caused almost a doubling in cell size at the highest sublethal concentrations. This was probably due to combination with sulphur-containing compounds that are important in the process of cell division. (Katz)
W74-11340

STUDIES ON THE MECHANISMS OF RED TIDE OCCURRENCE IN HAKATA BAY, 3. THE CHARACTERISTICS OF EFFECTIVE BOTTOM MUD AND ITS GEOGRAPHICAL DISTRIBUTION PATTERN, (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Faculty of Agriculture.
T. Honjo, and T. Hanaoka.
Bulletin of the Plankton Society of Japan, Vol 20, No 2, p 126-130, 1974. 4 fig, 4 ref.

Descriptors: *Red tide, *Bottom sediments, Marine algae, Water pollution sources, Water pollution, Laboratory tests, Growth rate, Pigments, Mud.
Identifiers: *Heterosigma sp, *Japan(Hakata Bay), Mud suspensions.

A red tide flagellate, Heterosigma sp., was cultured by addition of bottom mud (mud suspension) collected from Hakata Bay at six different times. The growth rate for each mud sample was calculated. Using these values, the correlation between the distribution of the water area where red tide frequently occurred and that of the bottom mud which caused an acceleration effect are discussed. The characteristics of bottom mud having an accelerating effect on the growth of Heterosigma sp. are also discussed. (Katz)
W74-11341

THE FLAGELLATA EXAMINED FROM POLLUTED WATER OF THE INLAND SEA, SETONAIKAI,
Hiroshima Univ. (Japan).
Y. Hada.
Bulletin of the Plankton Society of Japan, Vol 20, No 2, p 112-125, 1974. 3 fig, 4 tab, 24 ref.

Descriptors: *Eutrophication, Industrial wastes, Water pollution sources, Water pollution effects, Fishkill, Domestic wastes, Sewage, Dinoflagellates, Oysters.
Identifiers: *Blooming flagellates, *Japan(Inland Sea), Yellowtails, Rhodomonas ssp, Heterosigma ssp, Hemieutreptia ssp, Colorless flagellates.

Pollution of the Inland Sea, Hiroshima Bay and the adjacent region by industrial drainage, city sewage and human wastes, has caused a change in the species and number of blooming flagellates. Rhodomonas lacustris, Heterosigma inlandica and Hemieutreptia antiqua frequently bloom and cause great damage to cultured yellowtails in the Inland Sea. The colored flagellates, closely related to colored water have annually increased in number of species. Species blooming in polluted waters are noted. Several new species of algae are described. (Katz)
W74-11342

TOXICITY STUDY OF TWO OIL SPILL REAGENTS TOWARD HUDSON RIVER FISH SPECIES,
Marist Coll., Poughkeepsie, N.Y. Environmental Science Program.
R. Rehwoldt, L. Lasko, C. Shaw, and E. Wirhowski.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 2, p 159-162, 1974. 3 tab, 8 ref.

Descriptors: *Dispersion, *Oil, *Toxicity, Fish, Lethal limit, Bass, Carp, Eels, Perches, Killifishes, *New York, *Hudson River.
Identifiers: *Linear alkylate sulfonate, *Herder, *Dispersants, Collecting agents, Sublethal limit, Pumpkinseed, Fuel oil.

The median toxicity of No. 2 and No. 4 oils was determined in laboratory tests, as well as the effects of dispersants and collecting agents on this toxicity. Linear alkylate sulfonate (LAS) was the dispersant used and the collecting agent was Herder. Results showed that the dispersant is far more toxic for all species of fish tested than the oil, that the toxicity of oils increased in tanks containing sublethal amounts of LAS, and that Herder was both nontoxic and has little effect on the toxicity of oil to the species tested. (Katz)
W74-11344

GROWTH STIMULATION OF AXENIC RED ALGAE BY SIMPLE PHENOLIC COMPOUNDS,
Uppsala Univ. (Sweden). Inst. of Physiological Botany.
L. Fries.
Journal of Experimental Marine Biology and Ecology, Vol 15, p 1-9, 1974. 5 tab, 27 ref.

Descriptors: *Phenols, *Rhodophyta, Aromatic compounds, Organic compounds, Growth rate, Plant morphology, Biochemistry, Water pollution effects, Methodology, Toxicity, Chemical properties, Plant growth substances, Plant physiology.
Identifiers: *Goniotrichum alsidii, *Polysiphonia urcedata, *Growth stimulation vanillin, p-hydroxybenzaldehyde, Syringaldehyde, Veratraldehyde.

Since coumarin, caffeic acid, and ferulic acid are found to stimulate growth and/or morphology of the red alga Goniotrichum alsidii (Zanard.) Howe, representatives for other groups of phenolic compounds have been investigated in concentrations of 4 . 10-5 to 4 . 10-7 M. The strongest stimulation of growth was obtained with p-hydroxybenzaldehyde, vanillin, syringaldehyde, and veratraldehyde, while corresponding acids gave lower response. 3,4-dihydroxy benzoic acid, 3-methylcatechol, 4-methylcatechol and p-hydroxyphenyl pyruvic acid also enhanced growth. Polysiphonia urceolata (Dillw.) Grev. showed a very small or no response to the same compounds. The role of these active phenols is discussed. The high activity of p-hydroxyphenyl pyruvic acid could point to a plastoquinone, but no further conclusions can be drawn as long as the role of the bromophenols is unknown. (Katz)
W74-11346

DDT, DDE, AND PCBS IN THE TISSUES OF REEF DWELLING GROUPERS (SERRANIDAE) IN THE GULF OF MEXICO AND THE GRAND BAHAMAS,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 5B.
W74-11347

EFFECT OF OIL ON MARINE ECOSYSTEMS: A REVIEW FOR ADMINISTRATORS AND POLICY MAKERS,
National Oceanographic and Atmospheric Administration, Juneau, Alaska.
For primary bibliographic entry see Field 5G.
W74-11348

SUBLETHAL EFFECTS OF SEVERAL METALLIC SALTS-ORGANIC COMPOUNDS COMBINATIONS UPON THE HETEROTROPHIC MICROFLORA OF A NATURAL WATER,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
L. J. Albright, and E. M. Wilson.
Water Research, Vol 8, p 101-105, 1974. 3 fig, 3 tab, 10 ref.

Descriptors: *Organic compounds, *Microorganisms, *Heavy metals, Salts, Cations, Laboratory tests, Bacteria, Copper, Mercury, Zinc, Ponds, Plant growth, Lethal limit, Water pollution effects.
Identifiers: *Sublethal effects.

e effects of several sublethal combinations of
metallic salts Ag2SO4, CuC12, HgC12, ZnC12
h the organic compounds L-cysteine and albu-
n upon the heterotrophic activity of the
croflora of a natural water are studied. This
terotrophic activity technique is based upon the
take and mineralization of a radioactivity
elled metabolite by the indigenous microflora
the Simon Fraser University reflecting pool
ter. Data analysis by Michaelis-Menten enzyme
etics equations allows the estimation of the
ximum rate of heterotrophic activity as well as
determination of the turnover time of the
rient in question. The addition of a sublethal
mbination of Cu(2+) and Zn(2+) to a sample of
poolwater decreases heterotrophic activity to
proximately the same extent as the additive
crease caused by these two cations added
parately to samples of this water. Cu(2+) and
(2+) treated water samples do not recover the
metallic salt treatment activity following a
ee-day incubation. Both L-cysteine and albu-
n have no protective effect upon heterotrophic
ivity inhibition caused by Hg(2+) and Ag(+)
pectively, at the concentrations used.
rnigan-Vanderbilt)
'4-11352

**E VANADIUM AND SELECTED METAL
NTENTS OF SOME ASCIDIANS,**
lifornia Univ., Davis. Dept. of Chemistry.
r primary bibliographic entry see Field 5A.
'4-11353

**TROPHICATION: RECENT DIRECTIONS
R NEW PERSPECTIVES,**
ssina Univ. (Italy). Instituto di Idrobiologia.
Genovese.
v Int Oceanogr Med. 29 p, 53-61. 1973. Illus. En-
h summary.

scriptors: *Eutrophication.

e word and the concept of eutrophy have un-
rgone an evolution. In the beginning according
ts etymology, it was a natural and optimal con-
on of a body of water, characterized by its
alth of nutritive substances. Now the word
rophication is employed only to indicate pollu-
n conditions that are due to an excess of organic
stances or to the action of man. New studies
l experiments on samples of fresh water,
rine water of little lakes and estuaries and
ckish lagoons are considered in order to use
s potential nutritive wealth at different trophic
els.--Copyright 1974, Biological Abstracts, Inc.
'4-11357

**XICITY OF CHROMIUM COMPOUNDS
DER AEROBIC CONDITIONS,**
orgia Inst. of Tech., Atlanta. School of Applied
logy.
S. Ingols, and R. H. Fetner.
rnal Water Pollution Control Federation, Vol
No 4, p 366-370, April, 1961. 2 fig, 6 ref.

scriptors: *Chromium, *Toxicity, *Sludge,
icroorganisms, Bacteria, Laboratory tests,
lds, *Aerobic conditions, Water pollution ef-
ts.

aerobic studies a mixed culture (simulating ac-
ated sludge) was used for evaluating the toxicity
500 mg/l chromates. A sludge having a
dominance of sphaerotilus or one having a
dominance gave rather different responses to
same concentration of chromate. When a
dge was dosed with chromate at each feeding to
aluate the degree of acclimatization, the sludge
ame very bulky from filamentous growths.
cause of the different sludge responses, dif-
ent toxicities, and the different response of
lds and bacteria at 500 mg/l chromate in agar,
re cultures were used to evaluate the effect of
romate on respiration and to count the organ-
isms surviving the respiration study period at various concentrations of chromate. It is concluded that the degree of depression of respiration of an activated sludge by chromate during sewage treatment will depend on the amount of reproduction which would have occurred in the sludge within a short period of time. Chromates have an effect on the genetic expression of microorganisms, and chromic ions show a toxic effect on them, but the data do not indicate where the attack occurs. (Jernigan-Vanderbilt)
W74-11360

INTERRELATIONSHIP OF BIOCHEMICAL RESPONSES TO THE ABSORPTION OF INORGANIC LEAD,
Amsterdam Univ. (Netherlands). Coronel Lab. for Occupational Medicine and Environmental Health.
R. L. Zielhuis.
Archives of Environmental Health, Vol 23 No 4, p 299-312, October, 1971. 6 fig, 3 tab, 96 ref.

Descriptors: *Lead, *Toxicity, *Human pathology, Testing procedures, Inorganic compounds, Biochemistry, Measurement, *Absorption.
Identifiers: Subclinical effects.

Increases in the rate of the absorption of lead by human beings, beyond that which occurs in consequence of the inevitable exposure in the common environment, result in biological responses, represented by certain biochemical phenomena, without, necessarily, the development of any symptoms of lead poisoning. Articles in the scientific and professional literature dealing with the subject are examined. The relationships which exist between these biochemical responses to the absorption of lead are examined in order to demonstrate the extent to which each response can be employed as a prediction of the degree of lead absorption, as well as the status of the other phenomena. In this manner, the relative usefulness of these responses as indicators of the occupational hazard of lead absorption by exposed individuals and groups can be examined. Pb in the blood is recommended as a valid measure of exposure if methods of analysis are appropriate and when used in conjunction with another value such as Pb, ALA or coproporphyrin in the urine. (Jernigan-Vanderbilt)
W74-11362

THE AVIFAUNA OF SWEDEN AS INDICATORS OF ENVIRONMENTAL CONTAMINATION WITH MERCURY AND CHLORINATED HYDROCARBONS,
Environmental Protection Board, Stockholm, (Sweden). Wallenberg Laboratoriet.
For primary bibliographic entry see Field 5B.
W74-11367

MERCURY POLLUTION,
For primary bibliographic entry see Field 5B.
W74-11368

SCIENTISTS FIND HOW MERCURY DAMAGES CELLS,
HSMHA Health Reports, Vol 86, No 9, p 790, September, 1971.

Descriptors: *Animal pathology, *Mercury, *Cytological studies, *Rodents, Biochemistry, Animal physiology, Pollutants, Environmental effects, Toxins, Laboratory tests, Laboratory animals, Measurements, Evaluation.

Correlations between mercury and cell damage have been investigated by a team of University of Wisconsin scientists. Rats were fed doses of mercury simulating human intake and several kinds of cells were analyzed. Findings showed that mercury binds to the cell membrane structure and reduces the cell's amount of RNA. Although some cells are less adversely affected than others, no cells are immune to mercury poisoning. Nerve cells of the dorsal root ganglia located outside the spinal cord, which serve as the common pathway for sensory impulses coming into the central nervous system, suffered a 30% reduction in cell size, a 30% loss in the number of cells and more than 50% loss of RNA. Motor nerve cells in the spinal cord were only slightly affected by mercury. In these cells, mercury which got into the cells became concentrated in axons leaving the cell body unharmed, suggesting a compensatory effort by the cell to restore proper functioning. (Jerome-Vanderbilt)
W74-11369

EARLY ACTIONS OF CADMIUM IN THE RAT AND DOMESTIC FOWL-6 TESTICULAR AND MUSCLE BLOOD FLOW CHANGES,
Georgia Univ., Athens. Dept. of Animal Science.
A. D. Johnson, and P. C. Turner.
Comparative Biochemistry and Physiology, Vol 41A, No 3, p 451-456, 1972. 2 fig, 15 ref.

Descriptors: *Cadmium, *Zinc, *Rodents, *Birds, *Metabolism, Biochemistry, Animal physiology, Toxins, Environmental effects, Metals, Laboratory tests, Measurements.
Identifiers: Blood Flow Rates.

The action of cadmium on very early changes in relative blood flow (RBF) of the testis and muscle in the fowl and rat during the 120 min. period immediately following cadmium injection was examined. Male rats and domestic fowl were injected subcutaneously with 0.03m-moles of cadmium chloride/kg body weight with some of the rats previously treated with zinc acetate. In the fowl no blood flow changes were detected due to Cd. In the rat Cd resulted in a sharp increase in blood flow to the testis at 2.5 and 10 min. after Cd was administered, followed by a return to normal rates. Zinc acetate pretreatment resulted in blood flow which was higher than in the untreated rats. When this pre-treatment was followed by cadmium the sharp differences of blood flow rates of rats pretreated with zinc and rats which were not pretreated were not manifest. Cadmium acts on the vasculature of the testis of the rat but not that of the domestic fowl and zinc pre-treatment in the rat moderates the action of cadmium on the vasculature. (Jerome-Vanderbilt)
W74-11370

EFFECTS OF REGULATORY GUIDELINES OF THE INTAKE OF MERCURY FROM FISH - THE MECCA PROJECT,
National Marine Fisheries Service, Washington, D.C. Fishery Products Research and Inspection Div.
R. Finch.
Fishery Bulletin, Vol 71, No 3, p 615-626, 1973. 6 tab, 7 ref, append.

Descriptors: *Mercury, *Toxicity, *Human physiology, *Fish, Marine animals, *Public health, Diets, United States, Regulation.

The MECCA program applies a survey of the fish consumption habits of a sample of over 4500 individuals, representative of the U.S. population, to build a computer model, which uses known levels of microconstituents in 52 kinds of fish to predict the distribution of the daily intakes of the microconstituents from fish among the survey participants. The model was applied to mercury levels in fish to estimate the effects of guidelines (maximum permitted levels) for fish in protecting the population against excessive intake. The study indicated that, for the sample population, intakes of mercury from fish would remain safe if the guideline for mercury in fish were raised from the present level of 0.5 to 1.5ppm. The effect of such an increase would be of benefit to both the consumer and the fishing industry. This model can be used to predict the distribution of consumer in-

takes from fish of any constituent present in the fish, whether nutritious or potentially hazardous, for which the levels in the edible portion of the 52 kinds of fish used in the model are known. (Jernigan-Vanderbilt)
W74-11372

THE INTERACTION OF MERCURY WITH CADMIUM AND ZINC IN MAMMALIAN EMBRYONIC DEVELOPMENT,
Dartmouth Medical School, Hanover, N. H. Dept. of Anatomy.
T. F. Gale.
Environmental Research, Vol 6, No 1, p 95-105, 1973. 3 fig, 2 tab, 26 ref.

Descriptors: *Mercury, *Cadmium, *Zinc, *Animal pathology, *Embryonic growth stage, Pollutants, Environmental effects, Growth stages, Metabolism, Deformation, Toxicity.

Mercuric acetate together with either cadmium sulfate or zinc sulfate was administered intravenously to pregnant golden hamsters on the eighth gestation day in order to study their effects on embryogenesis. Upon sacrifice on either day 12 or 14 of gestation, the resorption and malformation rates were determined and all living embryos were examined for gross malformations. The detrimental effects of the mercury and cadmium combinations were more severe than those of the mercury and zinc combinations. With both combinations the severity of the embryotoxicity depends upon the method by which the metals are introduced and to some extent upon the dosage level of the Hg. The protective value of the zinc against the embryopathic effects of Hg is also determined by the method of administration of the two metals. Both types of malformations observed after the administration of either Cd or Hg alone were observed in animals treated with a combination of the two. The results are briefly correlated with known biological actions of Cd, Hg, and Zn. (Jerome-Vanderbilt)
W74-11375

CHARACTERISTICS AND RELATIONSHIPS OF MERCURY-RESISTANT MUTANTS AND METHIONINE AUXOTROPHS OF YEAST,
Rochester Univ. School of Medicine, N.Y. Dept. of Radiation Biology and Biophysics.
A. Singh, and F. Sherman.
Journal of Bacteriology, Vol 118, No 3, p 911-918, June, 1974 2 fig, 5 tab, 26 ref. NSF(GI300978)-PHS(GM12702).

Descriptors: *Mercury, *Metabolism, *Bacteria, Laboratory tests, Organic compounds, Testing procedures, Bacteriology, Microbiology, *Yeasts.
Identifiers: *Methionine antotrophs.

Approximately one-half of the mutants of Saccharomyces cerevisiae that are selected as resistant to methyl mercury are also found to require methionine. Eighty four percent of these met mutations occur at the met15 locus, and the remaining 16% occur at the met2 locus. Surprisingly, the methionine-requiring mutants are recovered at a much higher frequency on methionineless media than on media supplemented with methionine. Growth patterns of the met mutants on media having a continuous concentration gradient of methionine and mercury compounds indicate that, at a critical concentration of the mercury compounds, the methionine requirement of certain met mutants is partially or completely alleviated. This was found for met2, met15, and to a lesser extent for met6, but not for any other methionine mutants. This loss of methionine requirement is produced with methyl mercury, phenyl mercury, and mercuric chloride although met2 and met15 strains can be shown to be resistant only to methyl mercury. Other methionine auxotrophs are not resistant to any of the three mercury compounds. It is suggested that met2 and met15 mutants produce a simple diffusible substance, which detoxifies methyl mercury, which reacts with mercuric chloride to produce a sheen, and which is the cause of the methionine requirement. (Jernigan-Vanderbilt)
W74-11381

THE SEASONAL CYCLE OF COPPER CONCENTRATION IN BUSYCON CANALICULATUM L,
University of South Florida, St. Petersburg. Dept. of Marine Science.
S. B. Betzer, and M. E. Q. Pilson.
Biological Bulletin, Vol 146, p 165-175, April, 1974. 4 fig, 1 tab, 16 ref.

Descriptors: *Copper, *Gastropods, *Seasonal, *Sea water, Aquatic life, Mollusks, Testing procedures, Analytical techniques, Spectroscopy, Spatial distribution, Temporal distribution, Path of pollutants, Water pollution effects.
Identifiers: *Busycon canaliculatum.

Copper is present in seawater in only trace amounts (3 microgram/1). The copper concentration in marine gastropods, however, has been shown to be generally high, up to 100 microgram/g. This implies the presence of a mechanism for storing copper taken up either from the diet or directly from seawater. In this study, specimens of the locally abundant channeled whelk, Busycon canaliculatum L., were examined for copper concentration in various organs and tissues at different seasons of the year. Individual tissues of approximately 100 whelks were analyzed for copper content. Tissue copper concentrations showed a high degree of individual variation, but seasonal trends were evident. In the digestive gland, the organ with the highest copper concentration, the mean monthly concentrations were about 5 to 10 times higher in the summer (400-900 MICROGRAM Cu/g fresh weight) than in the winter (65-120 microgram Cu/g). Gut concentrations followed the same seasonal trend. Monthly average blood copper and protein ranged seasonally from an average of 42 microgram/ml in February to 175 microgram/ml in June. Whelks in Narragansett Bay usually begin to feed in late May or early June: the general early summer increases in the copper concentration of most tissues correlated with this commencement of feeding. (Jernigan-Vanderbilt)
W74-11384

TRACE ELEMENTS: A GROWING APPRECIATION OF THEIR EFFECTS ON MAN,
T. H. Maugh, II.
Science, Vol 181, p 253-254, July 20, 1973.

Descriptors: *Trace elements, *Human pathology, *Toxicity, *Nutrients, Inorganic compounds, Organic compounds, Lead, Mercury, Beryllium, Nickel, Public health, Food, *Water pollution effects, Air pollution effects.

The effects of the different trace elements on man are discussed. New research is continually expanding the number of metabolic systems known to be affected by trace elements and is revealing many relationships between trace element concentrations and abnormal states of health. The evaluation of trace element concentrations may soon play a fundamental role in the diagnosis of illness and even in prevention. Many trace elements are beneficial. Fourteen different trace elements have been identified as essential to human health. Cobalt, zinc, and manganese, for example, serve as cofactors for various metabolic enzymes, and iron is an integral component of hemoglobin. On the other hand, lead and methylmercury have been shown to damage the central nervous system. Cadmium decalcifies bones; beryllium is highly carcinogenic; nickel carbonyls have been implicated in lung cancer, etc. There is a great deal yet to be learned about the effects of trace elements on human physiology and a great many benefits to be obtained from this knowledge. However, it will be of little use if the practicing physicians do not start applying this new found knowledge. (Jernigan-Vanderbilt)
W74-11395

5D. Waste Treatment Processes

AGRICULTURAL WASTE WATER ACCOMMODATION AND UTILIZATION BY VARIOUS FORAGES,
Maryland Univ., College Park. Dept. of Agronomy.
V. Larsen, J. H. Axley, and G. L. Miller.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 631, $4.50 in paper copy, $2.25 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No 19, (1974). 92 p, 12 fig, 28 tab, 81 ref. OWRR A-006-MD(1). 14-01-0001-790.

Descriptors: *Farm wastes, *Sewage treatment, *Forages, *Crop production, *Denitrification, *Nutrient removal, Water reuse, *Nitrogen, *Poultry, Soil water, Groundwater, *Phosphorus, Loam, Sands, *Waste water treatment.
Identifiers: Sassafras sandy loam.

The influence of poultry processing plant sewage upon forages, soil, and the ground water was studied. Harvesting the forages resulted in removal of about 200 to 300 kg N/ha/year from the system. Ammonia volatilization from plant leaves and soil after sprinkler irrigation of the sewage was 35 to 110 kg N/ha/year. It never exceeded 10% of the applied nitrogen. Denitrification within the soil accounted for 20 to 70% of the applied nitrogen. Denitrification was more important in removal of nitrogen than harvesting of the crop, when more than 970 kg N/ha/year was applied annually as sewage. Soil water dilution of the effluent acted as nitrogen sink. It was important at lower sewage application rates, but negligible at the higher rates of 274 to 408 cm/year of sewage. Two and a half ppm NO3-N was found in the ground water at a depth of 6 m when 547 kg N/ha/year was applied. If the nitrogen application was increased to 3219 kg N/ha/year 11.2 ppm NO3-N was found in the ground water at a depth of 9 m. This is slightly above the safe limit of 10 ppm NO3-N assigned by the U. S. Public Health Service. Ninety-five to 99% of the applied phosphorus was removed from the sewage by the first 30 cm of the soil. A maximum phosphate adsorption study showed that it would take a minimum of 15 years for 3 m of this Sassafras sandy loam soil to become saturated with phosphorus if the phosphorus application rates in the sewage (508 cm/year) remained the same.
W74-10903

THE USE OF MAGNETIC IRON OXIDE FOR RECOVERY OF VIRUS FROM WATER,
New Hampshire Univ., Durham. Water Resource Research Center.
F. Pearson, and T. G. Metcalf.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 626 $3.25 in paper copy, $2.25 in microfiche. Research Report No 10, (1974). 38 p, 4 fig, 9 tab, 16 ref OWRR A-014-NH(1). 14-31-0001-3029.

Descriptors: *Iron oxides, *Viruses, *Microorganisms, Inorganic compounds, *Adsorption, Hydrogen ion concentration, *Waste water treatment, *Pollutant identification.
Identifiers: *Magnetic iron oxide, Aquatic virology, *Poliovirus, *Enterovirus, Elution, Virus recovery, Membrane filters.

Magnetic iron oxide was found to consist of a mixture of the gamma spinel of Fe2O3 and alpha spinel of Fe3O4. Electron micrographs showed a long, irregular, rod-like structure. Virus interaction with magnetic iron oxide was believed to occur at multiple combining points present at each

tahedral site of an Fe atom. The interaction was onsidered to be an adsorptive process. The egree of adsorption was dependent upon the elec-ostatic potential in effect between iron oxide and rus coat protein surfaces. The potential eveloped was a function of structural protein nization, and its extent the result of solution pH lative to protein isoelectric point. Virus interac-on with magnetic iron oxide was independent of on oxide arrangement in columns or this sand-ich-like layers. Virus recovery was most effec-ve when elutions from thin layers were made. dsorption was favored by acid pH while elution as best at alkaline pH. Virus recoveries of 90 per-nt were made from litre samples of distilled ater. Experimental findings led to a prediction of limited role for use of magnetic iron oxide for covery of virus from surface waters.
74-10905

CALE-UP SOLID BOWL CENTRIFUGE PER-ORMANCE,
uke Univ., Durham, N.C. Dept. of Civil En-neering.
A. Vesilind.
urnal of the Environmental Engineering Divi-on, American Society of Civil Engineers Vol 0, No EE2, p 479-486, April, 1974. 2 fig, 1 tab, 2 f.

escriptors: *Centrifugation, *Numerical analy-s, *Model studies, *Solid wastes, *Waste sposal, Separation techniques, Hydraulic pro-rties, *Waste water treatment.
entifiers: *Solid bowl centrifuge.

method for calculating centrifuge capacities sed on data from continuous geometrically nilar models is proposed. It is usually not possi-e to determine from field test data if per-rmance is limited by hydraulic or solids capaci-. Scale-up must be in terms of both solids and draulic loading. The hydraulic capacity of a ger solid bowl centrifuge can be estimated on e basis of data for a geometrically similar one erating on the same slurry. The solids handling pacity can also be estimated; the lowest rate us determined will limit performance and must used for scale-up. (Merritt-FIRL)
74-10914

FFICIENCY TESTS FOR MICROSTRAINER ASTE TREATMENT, (MAIKURO SUTORENA YORU SHORISUI KOJO SHIKEN),
agoya Municipal Government Dept. of Sewage orks (Japan).
Iwata, Y. Ito, and O. Kamata.
izu Shori Gijutsu, Vol 14, No 10, p 45-50, Oc-ber, 1973. 14 ref.

escriptors: *Sewage treatment, Water treatment, eatment methods, Municipal wastes, iochemical oxygen demand, *Suspended solids, Vaste water treatment.
entifiers: *Microstrainer.

e efficiency of 510-mesh microstrainer was aluated using the secondary treatment water of ewage treatment plant, and a mixture of prima-settling pond sewage screened by 60-mesh net d the secondary treatment water. The drum tation speed, cleansing water pressure, and spended solids (SS) concentration were varied observe the turbidity, SS, BOD, COD, and liforms, by sampling water every two hours for hours. The most important point in the function a microstrainer is the setting of filter loss head, hich has a close relationship with the SS and OD elimination rates. When a film is formed on e mesh, smaller SS can be eliminated and the mination rate of a given mesh improves. There-re, to get a maximum elimination efficiency, the s water head must be set for quick film forma-n; yet, if the loss water head is too great, the m will be destroyed and the elimination rate will crease. If SS concentration of the treatment water is constant, the relationship among loss water head and the drum rotation speed, and cleansing water pressure can be calculated. If the filter speed and cleansing water pressure are constant, the slower the rotation speed, the greater will be the loss water head. When SS was 7 ppm, the filter index was 7/m with the secondary treatment water; with the ximed sewage water of 15 ppm SS, FI was 5.2/m. Loss water head and SS-BOD elimination rates have close relationships, but the elimination conditions are quite different. With the secondary treatment water, when loss head was 19/mm, SS elimination rate was 42.3 percent, but BOD elimination with H (loss head) 12 mm was 31.2 percent. And when H increased, BOD elimination decreased. In the mixed sewage, with the loss head increase, BOD elimination rate decreased, but SS elimination rate increased gradually. The maximum COD elimination rate in any case was 10 percent; the microstrainer seemed ineffective for COD. (Seigle-FIRL)
W74-10915

EXPERIMENTAL HYDROPONIC GARDENING WITH MUNICIPAL WASTE WATER,
Florida Inst. of Tech., Melbourne. Dept. of Oceanography.
D. R. Sias, and T. A. Nevin.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 5, p 272-278 1973. 3 fig, 1 tab, 9 ref.

Descriptors: *Hydroponics, *Aquiculture, Municipal wastes, *Waste disposal, Municipal water, Irradiation, Chlorination, Agriculture, Tomatoes, *Recycling, *Waste water treatment, Water reuse.
Identifiers: Radishes.

The use of hydroponics in a municipal waste water reuse process was evaluated. Tomatoes and radishes were grown in five beds irrigated as follows: irradiated waste water from a Cobalt 60 facility; potassium nitrate added to waste water before irradiation; KNO3 added to waste water after irradiation, and untreated waste water as a control. Growth in the effluent after chlorination was one quarter of that in the control and was repressed when KNO3 was added to irradiated effluent. Radishes grown in irradiated waste water were appreciably heavier than any crops other than that grown as the control. Tomatoes also grew best in irradiated waste water, but seemed to do better when there was a higher concentration of nitrogen as nitrate. They grew poorly in chlorinated waste water, achieving only one third the weight of the controls. It is concluded that hydroponics, in its present state of development, is readily adaptable to the use of waste water treatment plant effluents, probably removing plant nutrients which might otherwise become pollutants, as well as producing foodstuffs economically. Further, a repeated use of otherwise lost water can be accomplished. (Merritt-FIRL)
W74-10917

RECOMMENDATIONS FOR INSTALLING PVC GRAVITY SEWER PIPING,
Plastics Pipe Inst., New York.
For primary bibliographic entry see Field 8A.
W74-10919

EPOXY TAR LINES BIRMINGHAM'S TRUNK,
For primary bibliographic entry see Field 8A.
W74-10920

SEWER-WITHIN-SEWER SAVES CITY $400,000,
A. W. Nester.
The American City, Vol 89, No 2, p 45-46, February, 1974.

Descriptors: Engineering structures, Sewers, *Combined sewers, *Separated sewers, Manholes, Pipes, *Storm drains, Tunnels, *Urban drainage, *Michigan.
Identifiers: *Flint(MI).

The city of Flint, Michigan effected the separation of 1800 feet of combined sewers by putting a pipe within a pipe, thus saving the city $400,000. The cost of open-cut or tunneling for separating the sewers was $600,000. A 14in. sanitary sewer line was laid in the invert of the old pipe, a cast-in-place, elliptical concrete pipe 60in. high and 40in. wide. The sanitary sewer connections were tied into it, and the line was covered with concrete. First, the combined sewer was cleaned. By working from manhole to manhole, a Transite asbestos-cement pipe was placed one eight foot section at a time. The sections were connected with pressure joints. Sanitary leads from buildings were tapped into the new sewer; new leads were routed along the interior wall contour of the old pipe and were fastened with stainless steel straps and anchors. Quick-set mortar sealant prevented leakage of sanitary sewage into the storm sewer during construction. When the sewer was in place, it was concreted over with 3500psi concrete. (Murphy-FIRL)
W74-10921

USE OF PIPELINES AS AEROBIC BIOLOGICAL REACTORS,
General Electric Co., Philadelphia, Pa.
C. M. Koch, and I. Zandi.
Journal of the Water Pollution Control Federation, Vol 15, No 12, p 2537-2549, December, 1973. 2 fig, 1 tab, 19 ref.

Descriptors: Engineering structures, *Sewers, *Treatment facilities, *Biochemical oxygen demand, Water pollution, Municipal wastes, *Aerobic treatment, *Wastewater treatment, *Mathematical models, Model studies.

Sewerage systems of many cities comprise both pressure and gravity lines. It has been suggested that these lines may be used as aerobic biological reactors to reduce the biochemical oxygen demand on treatment facilities. The utilization of the pipelines as a treatment facility to stabilize the organic portion of solid waste while it is being conveyed in slurry form has also been proposed. Stabilization of the combined solid waste and wastewater is another possibility. If the converted conduits are relatively long, the BOD reduction may be considerable. An analysis of pressure pipeline reactors, sometimes called tubular reactors, with the view towards using pressure pipelines as aerobic biological treatment facilities is presented. A mathematical model and a case study are developed. Parameters considered are wastewater flowrate, initial pressure head, seed inoculum concentration, pipe diameter, gas flow rate, air to slurry ratio, DO concentration, gaseous oxygen concentration, initial BOD, temperature, pumping station location with respect to pressure, and gas injection commencement when the DO levels fall below a given value. Also considered were the biological kinetic constants for municipal wastewater. The economic practicality of this form of treatment was not considered, but it was shown that BOD reduction could be effected. (Murphy-FIRL)
W74-10925

PURE WATERS PROJECT INCLUDES RESTORATION,
R. Dyment.
Water and Sewage Works, Vol 121, No 3, p 52-53, March, 1974.

Descriptors: Water pollution, Water resources development, Water treatment, *Project planning, Projects, Management, Water management(Applied), *Treatment facilities, Methods, *New York, *Lake Ontario, Great Lakes, *Sewers, *Wastewater treatment.
Identifiers: *Monroe County(NY).

Monroe County, New York began a pure waters program in 1970 that will cost $400 million by the time it is completed in 1975. It includes the laying of hundreds of miles of sewer lines, constructing four treatment plants, tearing up streets and private land, and restoring whatever was disturbed to its original state. Lake Ontario and other water bodies in Monroe County are polluted to degrees varying from severe to moderate, with population growth increasing rapidly, thus adding to the pollution problems. The county was divided into four regions according to drainage basins, and sewer networks and treatment plants constructed accordingly. The new treatment plants will provide a minimum of secondary treatment of wastewater. Attempts have been made to minimize the ecological disruptions during the construction of the sewers and treatment plants. (Murphy-FIRL)
W74-10926

LINEARLY DECREASING VELOCITY - WEIRS,
College of Engineering, Madras (India). Dept. of Hydraulics and Water Resources.
D. Chandrasekaran, and N. S. L. Rao.
Surveyor, No 4263, p 30-32, February, 1974. 3 fig, 3 ref.

Descriptors: Engineering structures, Sewers, *Weirs, Control, *Sediments, Treatment facilities, *Wastewater treatment, *Sewage treatment, *Settling basins.
Identifiers: Proportional weirs, Grit chambers.

The problem of settling of sediment particles is important in sewage treatment units as in grit chambers, water purification works and in the treatments of a variety of industrial wastes. Among the many factors that affect settling, the mean velocity of flow can be readily controlled by the designer by fixing suitably designed weirs at the outlets of sedimentation chambers. The exact design of such a weir is presented. The type of proportional weirs presented have potential as velocity controlling devices and are capable of trapping sediments to a removal efficiency of 60 to 85%. (Murphy-FIRL)
W74-10927

DIRECT-FILTRATION STUDIES FOR METROPOLITAN TORONTO,
Proctor and Redfern, Toronto (Ontario).
R. G. Tredgett.
Journal of the American Water Works Association, Vol 66, No 2, p 103-109, February, 1974. 6 fig, 5 tab, 17 ref.

Descriptors: *Water treatment, *Treatment facilities, *Filtration, *Municipal wastes, Water quality, *Flocculation, *Lake Ontario, Great Lakes, Computers, Data processing, *Canada, *Wastewater treatment.
Identifiers: *Toronto.

The Municipality of Toronto will solve an unusual water treatment requirement with a plant addition of modified design for $4.8 million less than the cost of a conventionally designed plant. The old 72mgd plant, located on an offshore island in Lake Ontario, is to be doubled in size. The plant has been operating since 1911 but now only operates seasonally to meet peak summer demands. It has kept detailed records of the raw water quality. Analysis of these, assisted by a computer, supported the possibility of direct filtration. Pilot studies confirmed that efficient filtration at high rates was feasible and that flocculation and settling basins could be eliminated. The new plant will incorporate these features with significant savings. The size and quality of the floc produced for filtration is critical to this design. Whereas settling requires a large flow, high-rate direct filtration requires a strong, pinpoint floc barely visible to the eye. Although the requirements of the new plant are unusual, the principles leading to its design are quite basic and may be of interest in the Great Lakes area or any area with good quality raw water. (Murphy-FIRL)
W74-10928

ARTIFICIAL AQUIFER STOPS STORM POLLUTION.
The American City, Vol 89, No 5, p 106, May, 1974.

Descriptors: *Combined sewers, *Aquifers, *Plastics, *Wastewater treatment, *Storm runoff, *Sewage treatment, *Ohio, Municipal wastes, Cities, Stormwater, Stormflow, Costs, Clarification.
Identifiers: *Stormflow treatment, Clarification-chlorination basin.

Akron, OH has solved the problem of combined storm and sanitary sewers by an underground, plastic-encased artificial aquifer. This is both effective and inexpensive. Stormflows are diverted into a clarifier where waste water is settled and chlorinated. It is then stored in the plastic aquifer until it can be accepted at the sewage treatment plant. Surface land above this underground cell may still be used for other purposes, thus eliminating land acquisition costs. (Prague-FIRL)
W74-10929

MEMBRANES FOR REVERSE OSMOSIS,
United Kingdom Atomic Energy Authority, London (England). (assignee).
D. Walmsley.
U.S. Patent 3,807,571. Issued April 30, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 1911, April 30, 1974. 1 fig.

Descriptors: *Patents, *Reverse osmosis, *Wastewater treatment, *Membranes, *Cellulose.
Identifiers: *Cellulose acetate.

A cellulose acetate reverse osmosis membrane, a method of making such a membrane by casting, and a solution suitable for use in casting such a membrane are described. The particular features lie in the selection of a narrow range of acetyl values for the cellulose acetate, obtained by blending cellulose acetates having acetyl values falling outside the selected range, and in the composition of the casting solution which includes acetone dioxan and formamide. The membranes of the invention are further characterized in having Indices of Performance (IOP) of at least 50; frequently the IOP is higher than 100. (Murphy-FIRL)
W74-10932

METHOD AND APPARATUS FOR THE TREATMENT OF INFLUENT WATERS SUCH AS SEWAGE,
M. E. Neel.
U.S. Patent 3,808,123. Issued April 30, 1974. Official Gazette of the U.S. Patent Office, Vol 921, No 5, p 2047, April 30, 1974. 1 fig.

Descriptors: *Patents, *Wastewater treatment, *Oxidation, *Sewage treatment, *Aeration, Odor.

A method and apparatus are described for treating influent waters such as sewage, waste water, discharges from petroleum or chemical plants, or other materials requiring oxidation. A pressure vessel is utilized into which the influent waters are moved under pressure. The pressure within each vessel is maintained within a desired range, and an oxygen stream is pumped into the influent waters. To insure proper contact with the oxygen, detention time within the vessel is provided. Fine bubble diffusers are used to inject the oxygen stream; these diffusers are spaced at various locations and if desired at varying levels within the vessel. Means are provided to vary the quantity of the oxygen stream introduced into the vessel at various points, as well as to vary the percentage of oxygen in the oxygen stream itself. The apparatus and method may be employed at various locations in a sewer system as intermediate steps to prevent excessive build-up of odor or corrosion, or with additional equipment, such as tapered aeration tanks, or aeration tanks, or aerobic digesters, to form a complete treatment plant. (Murphy-FIRL)
W74-10933

DIGESTION BYPRODUCT MAY GIVE ANSWER TO ENERGY PROBLEM,
Knoerle, Bender, Stone and Associates, Chicago, Ill.
J. Goeppner, and D. E. Hasselmann.
Water and Wastes Engineering, Vol 11, No 4, p 30-35, April, 1974. 6 fig, 1 tab.

Descriptors: Energy, *Methane, *Anaerobic digestion, *Sludge digestion, Sewage, *Wastewater treatment, Waste disposal, *Byproducts, Treatment facilities.
Identifiers: *Energy sources.

The methane gas which is produced during the anaerobic digestion of sludge is discussed as a possible source of energy. The volume of methane generated in anaerobic digestion is dependent upon the nature and volume of the wastes. Current data indicate that 15 to 20 cu ft of gas are produced per pound of volatile organic material destroyed. The gas produced by fermentation contains about 60-70% methane; carbon dioxide is the predominant remaining constituent. From 100 gal of sewage it would be theoretically possible to obtain more than one cubic foot of combustible gas having a heating value of 650 BTU. Construction costs of digestion units are integral in determining economic feasibility of such an energy source. It was found that for fuel generation alone anaerobic digestion would not be economically possible. However, the process can be used to affect the use of outside procured energy to operate the treatment plant. The possibility of using this process with animal wastes is explored. The estimated electrical power capacity potentially available from the wastes of 12 million beef cattle represents about one percent of the total U.S. capacity. Assets of this system of energy production are ease of storage of digester gas, and ease of transport. Anaerobic digestion facilities at existing sewage treatment plants incorporate design features which are compatible with adoption of gas recovery systems. (Murphy-FIRL)
W74-10935

PROBLEMS ON POLLUTION AND WATER RESOURCES IN THE NEW YORK CITY METROPOLITAN AREA,
New York City Dept. of Water Resources.
M. Lang.
Hudson River Colloquium, Annals of the New York Academy of Sciences, Vol 250, p 178-181, May 24, 1974.

Descriptors: *Waste water treatment, *Storm drains, *Storm water, Ecosystems, Financing, New York, Costs, Municipal wastes, Sewage treatment.
Identifiers: *Ecological analysis, Ecological monitoring, *New York City.

The size and scope of New York's sewage treatment effort are discussed. The City has made substantial progress toward its goal of high-degree secondary treatment. Of the 1.5 billion gallons/day of sewage in the city, 75 percent currently receive secondary treatment. The other 25 percent is discharged untreated into the estuary, principally from the west side of Manhattan. The city has currently embarked on a program to construct two new treatment plants and upgrade 12 existing ones, the cost of which is estimated to be $2.3 billion. Plans for a storm water treatment plant on the shore of Jamaica Bay are discussed as well as a comprehensive ecological analysis and monitoring program for the bay and parts of the estuary. A more detailed breakdown of expenditures on the basis of Federal, state, and local shares is also given. (Shaffer-FIRL)
W74-10942

IIAGARA FALLS WATER PLANT CONVERTS GRAVITY FILTERS HYDRAULICALLY.
Vater and Pollution Control, Vol 112, No 4, p 66-7, April, 1974. 3 fig.

Descriptors: *Filters, Hydraulics, *Gravity, Treatment facilities, Sands, Gravel, *Canada, Municipal water, Sewage treatment, *Waste water reatment, *Filtration.
Identifiers: *Dual media filters, *Niagara Falls(Ontario), Anthrafilt system.

Niagara Falls (Ontario) sewage treatment plant of 6 rapid gravity filters and maximum capacity of 0 million Imperial gallons per day was having its utput impeded by a sluggish rate of filtration. It vas necessary to improve this rate without acrificing water quality. Consulting engineers ecommended that the 8 new filters in the exanded portion of the plant be operated at 4 gal/sq /minute (twice the original rate); the eight older lters be operated at 1 gal/sq ft/minute; and each f the two settling tanks be operated at rates that ould give comparable effluent quality. The new lters were converted to the dual media type. The ual media configuration gives the following struc-ire: anthrafilt on top, a layer of sand below this, a ayer of gravel below the sand which is underlaid y the draining system. Unfortunately, in this case ie anthrafilt was already in place and it was ecessary to devise a way of introducing the sand ayer beneath the anthrafilt with minimum isturbance to the filter. This was done by placing and on top of the anthrafilt and then using a ackwash flow (gradually increasing in rate with me) to fluidize the two media which then sorted iemselves properly with the sand ending up eneath the anthrafilt. (Shaffer-FIRL)
W74-10943

TUCSON TACKLES TWO PROBLEMS.
Vater and Wastes Engineering, Vol 11, No 5, p 66, May, 1974.

Descriptors: *Water reuse, *Waste water treatment, *Irrigation, Costs, Efficiencies, Water conservation, *Arizona, Treatment facilities, Cities.
Identifiers: *Tucson(Ariz).

A $1.5 million waste water reclamation plant, now eing built by the city of Tucson, Arizona, will opefully eliminate two problems for that city. First, the new plant will help relieve the present verload on one of the main 10 inch sewer lines erving the rapidly growing southeast side of the ity. Secondly, it will provide irrigation water for ie city's two golf courses. Currently, irrigation vater for these golf courses is purchased from the ity water department. The new practice will be heaper and will conserve 547.5 million gallons per ear of precious groundwater supplies in this esert region. A brief summary of the plants peration and hardware is included. (Shaffer-FIRL)
W74-10945

THE PRESSURE SEWER: A NEW ALTERNATIVE TO THE GRAVITY SEWER,
New York State Dept. of Environmental Conservation, Albany.
. G. Carcich, L. J. Hetling, and R. P. Farrell.
Civil Engineering-ASCE, Vol 44, No 5, p 50-53, May 1974, 6 fig.

Descriptors: *Sewers, *Waste disposal, Costs, Groundwater, Infiltration, Pressure, *New York, Pumps, *Waste water treatment.
Identifiers: *Pressure sewers, *Albany(NY), Grinder pumps.

The key to a new pressure sewer system is the rinder pump. Placed in the basement of the ouse, the pump grinds up large particles in the ousehold sewage and discharges this fluid to a mall diameter pressure sewer. The chief advantages gained by use of such a system are the reduction in sewer installation costs (the pipe need only be laid just below ground level); and elimination of groundwater infiltration. In testing performed in the Albany, New York area it was found that pressure-sewer waste was 100 percent stronger on a concentration basis, yet 50 percent less contaminants were in the water on a gm/capita/day basis than in conventional gravity sewer waste water. Sewage volume was 2/3 lower on a per capita basis than for conventional systems, primarily due to the elimination of groundwater infiltration. The small diameter pressure sewer appears to be a proven technology. More than 20 projects using this type of system are either in operation, under construction, or being designed. (Shaffer-FIRL)
W74-10946

SENSORS FOR WATER AND WASTEWATER PROCESS CONTROL,
North Carolina Univ., Raleigh. Dept. of Environmental Sciences and Engineering.
J. D. Johnson.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 44-46, 1974.

Descriptors: *Monitoring, *Sampling, *Waste water treatment, *Water treatment, Water analysis, On-site investigations, On-site data collections, *Pollutant identification.

Proper design of water and waste treatment process monitoring requires selection of the most meaningful parameters for the control of the process. Obtaining a representative sample from a process stream is just as difficult as obtaining a representative sample from a lake or a river. Vertical, horizontal and longitudinal variations in flow patterns are typical in both plug flow and completely stirred reactor system. For this reason in situ measurements are generally more desirable than collection of the sample for the performance of the analysis at another location. It is important to measure both activity and concentration and to control these processes in water treatment practice. Examples are the control of oxygen. The partial pressure, an activity measurement, is the most important parameter in the activitated sludge process while the total quantity of oxygen as determined by Winkler titration is most important in a waste effluent discharged to a stream. The oxygen activity determines the biological activity of the process while the concentration determines the volumetric impact of the low oxygen water on the stream. Many electro-chemical sensors like the glass electrode and the oxygen electrode are now available which measure activity directly when properly calibrated. (See also W74-10947) (Knapp-USGS)
W74-10958

WASTE WATER MONITORING PROGRAM BY THE CITY OF NEW YORK,
New York City Environmental Protection Administration. Dept. of Water Resources.
S. L. Kirschner, E. O. Wagner, and M. Lang.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 61-66, 1974. 2 fig, 1 tab.

Descriptors: *Monitoring, *Sampling, *Waste water treatment, New York, Sewage, Sewage treatment, Laboratory tests.
Identifiers: *New York City.

The City of New York monitors waste water treatment plant operations. New York Harbor is sampled during the summer for a minimum of 12 weeks (four days a week). Top and bottom grab samples at more than 40 locations are obtained and analyzed for temperature, salinity, BOD, dissolved oxygen (DO) and total coliforms (MPN). Four process control laboratories service the 13 treatment plants. Samples are obtained from raw sewage, primary effluent, aerator effluent, thickener effluent, final tank effluent, return sludges and digested sludge and analyzed for suspended solids (SS) and BOD. Volatile acids, alkalinity, pH, methane, CO2, and H2S are routinely measured on digester samples. Chlorides, temperature and pH are also measured on the raw sewage. The City has established limits for some toxic industrial discharges to the sewer system. Waste waters are routinely analyzed for pH, Cd, Cr, CN, Cu, Hg, Ni, BOD and SS. (See also W74-10947) (Knapp-USGS)
W74-10962

AUTOMATED WET CHEMICAL ANALYSIS INSTRUMENTS FOR CONTINUOUS EFFLUENT MONITORING,
Technicon Industrial Systems, Tarrytown, N.Y.
R. D. Goldberg.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 111-118, 1974. 7 fig.

Descriptors: *Monitoring, *Water pollution control, *Waste water treatment, Automation, Sampling, *Pollutant identification, Chemical analysis, Water analysis.

Continuous flow, automatic chemical analysis is a powerful new tool which will permit specific chemical monitoring functions directly in the plant, continuously and with considerable speed and ease. Automated tests, whether performed on discrete samples in the laboratory or continuously for monitoring or process control in the plant or on waterways are more accurate and precise than the equivalent manual tests. Automated analyses costs are usually much lower than conventional testing costs. In the more complex applications these instruments are used to maintain optimum conditions in the manufacturing process or waste treatment process to insure that the presence of pollutants is held to an acceptable minimum at the plant's outfall. (See also W74-10947) (Knapp-USGS)
W74-10971

USE OF CHEMICAL-SENSING ELECTRODES IN MONITORING,
Orion Research, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5A.
W74-10972

MUSKEGON COUNTY WASTEWATER MANAGEMENT SYSTEM NO I,
Teledyne Triple R, Muskegon, Mich.
Y. A. Demirjian.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 135-154. 1974. 7 fig, 6 tab, 16 ref.

Descriptors: *Waste water treatment, *Irrigation water, *Waste water disposal, Irrigation, Sprinkler irrigation, *Michigan, *Water reuse.
Identifiers: *Land disposal(Wastes), *Muskegon(Mich).

The largest land wastewater treatment facility in operation in the United States is the Muskegon County Wastewater Management System No. 1. The BOD load is being reduced by 90%; the COD load is being reduced by 75%, and the BOD to COD ratio is 1:4. There is no substantial drop in the metal levels in the treated water. The phosphate and ammonia levels drop during the treatment process while nitrate levels show a gradual increase during the treatment process. In

general, the level of nutrients is low in this system, averaging 3 mg/liter of phosphates and nitrate. Irrigated drained water shows substantial improvement in quality. Agricultural studies indicate a 100-400% increase in yield potential of various soils due to irrigation. (See also W74-10947) (Knapp-USGS)
W74-10976

INDUSTRIAL WASTEWATER MONITORING: BASIC CONSIDERATIONS,
Tennessee Univ., Knoxville.
P. A. Pagoria.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 157-164, 1974.

Descriptors: *Monitoring, *Water pollution control, *Industrial wastes, Federal water pollution control act.

Waste water may be monitored to provide information for design and operation of treatment facilities, to provide information to aid in computing process material balances for process control, to serve as a basis for computing user charges or surcharges where industrial wastewaters are discharged into municipal wastewater systems, to provide a record of compliance (or non-compliance) with effluent standards, and to provide records which can serve as a basis for defense in legal actions. Most industries not presently involved in monitoring programs will be involved in the very near future as dictated by the Federal Water Pollution Control Act Amendments of 1972. The basics of measuring flows, sampling techniques, analysis techniques, and continuous monitoring systems are reviewed to help those concerned to develop the most suitable system to fit their particular needs. (See also W74-10947) (Knapp-USGS)
W74-10978

WASTE AND WATER MONITORING,
Dow Chemical Co., Midland, Mich.
C. E. Hamilton.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 165-168, 1974. 2 tab.

Descriptors: *Monitoring, *Water quality, Waste water treatment, Industrial water, Industrial wastes, Water pollution control.

A water and waste monitoring program in a chemical plant measures and controls water quality for the process uses, process wastes, treatment facilities loading, treatment evaluation, plant effluents, and the receiving stream. Many parameters are measured by continuous or continual automatic instrumental systems. Monitoring data from remote locations are recorded locally and telemetered to a central instrument panel in the treatment plant. A total of about 250 million gallons per day of three different waters and one waste water are influent to the plant. Most of this water is used only for cooling, but about 60 million gallons per day is used in processes which generally contaminate it with some amount of a wide variety of organic and inorganic chemicals. Many of these impurities are removed by a secondary biological treatment plant. The problem is especially critical in that the quality of the river downstream under low-flow conditions can be essentially that of the combined effluents. (See also W74-10947) (Knapp-USGS)
W74-10979

DETERMINATION OF CHLORINATION EFFECTS ON ORGANIC CONSTITUENTS IN SEWAGE TREATMENT PLANT EFFLUENTS: A COUPLED 36CL TRACER--HIGH-RESOLUTION CHROMATOGRAPHIC TECHNIQUE,
Oak Ridge National Lab., Tenn.
R. L. Jolley.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 256-264, 1974. 2 fig, 2 tab, 20 ref.

Descriptors: *Chlorination, *Chemical analysis, *Tracers, *Gas chromatography, Chlorine, Analytical techniques, *Sewage treatment, *Waste water treatment, Disinfection, Organic compounds, Path of pollutants.

Chlorination effects on complex, microgram-per-liter solutions of organic compounds at milligram-per-liter chlorine concentrations, in effluents of sewage treatment plants, were studied using Cl-36 radioactive tracers with high-resolution chromatography. Over 40 chlorine-containing organic compounds were chromatographically separated from a chlorinated primary effluent of a domestic sanitary sewage treatment plant. (See also W74-10947) (Knapp-USGS)
W74-10989

LIGHT ENERGIZED OXIDATION OF ORGANIC WASTES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
J. W. Sargent, and R. L. Sanks.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 265-272, 1974. 8 fig, 8 ref.

Descriptors: *Organic wastes, *Waste water treatment, Organic compounds, *Oxidation, *Aerobic treatment, Aeration, Industrial wastes.
Identifiers: *Dye-sensitized photo-oxidation, Cresols.

Dye-sensitized aerobic photo-oxidation is a process by which many organic compounds can be oxidized chemically in the presence of a photo-sensitizing dye, visible light and molecular oxygen. In water solution, the sensitizer dye absorbs energy from visible light and transfers it to the oxygen-substrate reaction system where photo-oxidation occurs. The dye can be removed from reuse and only light energy, energy for aeration, and molecular oxygen are spent. Many of the substances found in domestic and industrial wastes (including refractory organics such as phenols, cresols, TNT, and unsaturated nitriles) should be susceptible to photo-oxidation. Most microorganisms, including viruses, can be killed by low concentrations of photo-sensitizing dyes in the presence of light and oxygen. Methylene blue, a readily available dye, is an effective sensitizer for cresol photo-oxidation and would likely sensitize photo-oxidation of other refractory molecules. The photolysis of cresol occurs as much as 2.8 times faster in an aerobic system than in an anaerobic system. (See also W74-10947) (Knapp-USGS)
W74-10990

THE DETERMINATION OF BENZIDINE IN WASTEWATERS,
Los Angeles County Sanitation Districts, Whittier, Calif. San Jose Creek Water Quality Lab.
For primary bibliographic entry see Field 5A.
W74-10991

CHEMICAL PROFILES OF KRAFT PAPER MILL TREATED WASTEWATERS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
L. H. Keith.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 278-281, 1974. 2 fig.

Descriptors: *Waste water treatment, *Pollutant identification, Organic compounds, *Pulp wastes, *Industrial wastes, *Organic wastes, Phenols, Organic acids.

In the effluents of two unbleached-kraft paper mills, specific compounds were identified using gas chromatography and mass spectrometry. The primary clarifier exerted little change on the composition or concentration of dissolved organics. The trickling biofilter was effective for reducing the phenolic content but exerted little influence on the other dissolved organics. The aerated lagoon reduced some of the terpene content but most of the terpenes and other neutral compounds remained in 50% or more of their original concentrations. Some fatty and resin acid concentrations were reduced by the lagoon, but more were apparently increased in concentration and a number of new compounds, possibly aquatic life metabolites, appeared during this stage of treatment. Lime flocculation reduced neutral compounds to less than 50% of their original concentration, possibly as a result of adsorption. Lime flocculation had little effect on phenols, but it did cause some reduction of fatty and resin acids. The large biological stabilization pond greatly reduced the phenolic concentration and substantially reduced the concentration of most terpenes and other neutral compounds. Resin acids and terpenes were resistant to both treatments. Phenols as a class were susceptible to both treatments but traces of them could still be found in the fully treated effluents. The more highly substituted phenols were more resistant. (See also W74-10947) (Knapp-USGS)
W74-10992

COAL HUMATES FOR THE REMOVAL OF WATER POLLUTANTS ASSOCIATED WITH THE USE OF COAL,
Missouri Univ., Columbia. Dept. of Chemistry.
S. Harlan, J. Green, and S. Manahan.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 282-284, 1974. OWRR B-095-MO(2).

Descriptors: *Water pollution control, *Air pollution, *Humic acids, *Coal mine wastes, *Acid mine water, Sulfates, Trace elements, Heavy metals, Chelation, Sorption, *Waste water treatment.

Humic substances prepared from coal show considerable potential for the removal from water of several important pollutants arising from coal. Coal humates have acid-base properties and in the basic form are very effective in neutralizing acidity in water. They are chelating materials and bind strongly to a number of heavy metals and iron. Coal humates in the basic form should be effective in absorbing sulfur dioxide from stack gas. The acid-insoluble coal humic acids have potential for sorbing organic pollutants and entraining fine particles. Some of the most common methods for the preparation of coal humates are alternate exposure to air and base, alternate exposure to acidic oxidizing agents and base, and continuous treatment with an oxidizing agent such as air or permanganate in a basic medium. (See also W74-10947) (Knapp-USGS)
W74-10993

CATION-EXCHANGE REMOVAL OF COPPER FROM AMMONIACAL AQUEOUS SOLUTION,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
P. S. Bull, and J. V. Evans.

vailable from NTIS, Springfield, Va. 22161 as AEC/E259, Price $3.25 printed copy; $2.25 icrofiche. Report No E259, March 1973. 17 p, 4 , 1 tab, 38 ref.

escriptors: *Ion exchange, *Adsorption, Copper, *Waste water treatment, *Nuclear werplants, Ammonia, Boiler feed water, Pre-eatment(Water).

ne ability of the cation-exchange resin of a con-nsate purification plant to remove copper down very low levels is not likely to be impaired by e presence of ammonia. The complex ammine ecies formed in the aqueous ammoniacal en-ronment are adsorbed onto cation-exchange sins as readily as the uncomplexed cupric ion d are held as strongly. The presence of copper in e feedwater of direct cycle nuclear power reac-rs can lead to the deposition in the reactor core copper oxides on the fuel element surfaces. ee also W74-11028) (Knapp-USGS)
74-11027

HE PERFORMANCE OF POWDERED ION-XCHANGE RESINS,
ustralian Atomic Energy Commission Research tablishment, Lucas Heights.
S. Bull, J. V. Evans, and F. D. Nicholson.
vailable from NTIS, Springfield, Va. 22161 as AEC/E258, Price $3.25 printed copy; $2.25 icrofiche. Report No E258, March 1973. 19 p, 9 , 2 tab, 16 ref.

escriptors: *Ion exchange, *Resins, Adsorption, nion exchange, Cation exchange, Water purifica-on, Boiler feed water, Nuclear powerplants, Pre-eatment(Water), *Waste water treatment.

ne coating properties and ion exchange per-rmances of powdered ion-exchange resins were amined in a small test facility. Satisfactory resin oatings were obtained with cation:anion resin tios in the range 1:1 to 3:1 but use of a 9:1 resin tio resulted in a high pressure drop across the oating. The settled resin volume was a reliable ide to the coating performance of resin slurries. ne ion-exchange capacity of the cation resin in-eased to a small extent with a decrease in sodium ncentration in the influent water down to 500 icrograms per liter. Within the ranges examined, sin ratio, resin loading and flow rate had no sig-ficant effect on cation capacity. (See also W74-027) (Knapp-USGS)
74-11028

VALUATION OF A MULTIFILTRATION VATER RECLAMATION SUBSYSTEM TO ECLAIM DOMESTIC CLOTHES WASH VATER,
ational Aeronautics and Space Administration, angley Station, Va. Langley Research Center.
B. Hall, Jr.
vailable from NTIS, Springfield, Va. 22161 as ASA TM X-2781, Price $3.00 printed copy; $2.25 icrofiche. Technical Memorandum X-2781, May 73. 25 p, 2 fig, 4 tab, 4 ref, 3 append.

escriptors: *Water reuse, *Filtration, *Waste ater treatment, *Domestic wastes, Phosphates, acteria, Detergents, Surfactants, Filters, Reclaimed water.
entifiers: *Washing machine wastes.

multifiltration water reclamation subsystem was sted to determine its capability to recover water om domestic clothes wash water. A total of 32.89 of clothes were washed during eight wash cy-es which used 0.635 kg of detergent, 549 liters of ot water and 507 liters of cold water. Water covered at a weighted average process rate of .42 liters per hour met the majority of the 23 quirements established for potable water by the .S. Public Health Service. Average power con-med during this evaluation was approximately .8 watt-hours per liter of water recovered. Filter replacement, which was required primarily for the control of micro-organisms in the recovered water, averaged 4.86 filters per 379 liters of wash water processed. The subsystem removed approx-imately 98 percent and virtually 100 percent of the phosphates and surfactants, respectively, from the wash water. (Knapp-USGS)
W74-11029

COMPUTER SIMULATION OF WASTE WATER TREATMENT BY CHEMICAL-PHYSICAL PROCESSES,
Envirotech Corp., Palo Alto, Calif. Municipal Equipment Div.
A. Anand, J. Gibbs, W. C. Laughlin, Jr., and R. J. Sherwood.
Effluent and Water Treatment Journal, Vol 14, No 3, p 155-160, March 1974. 2 fig, 3 tab, 5 ref.

Descriptors: *Computer models, *Simulation analysis, *Waste water treatment, *Water quality control, Design, Operations, Costs, Municipal water, Wastes, Systems analysis.
Identifiers: *Chemical-physical treatment, Flow sheet, Sensitivity analysis, Sizing, Material balance, Economic analysis.

Chemical-physical waste water treatment (CPT) has become a viable alternative to conventional biological plus tertiary processes. But experience in CPT is limited and the processes themselves raise quite a number of complex design, cost, and operation questions making proper analysis difficult. Described in detail is a program of computer simulation models which offers the flexibility to consider alternative waste water treatment flowsheets, design criteria, costs, and operating parameters and provides the power to analyze these with an exactness and speed impossible to achieve by hand calculation. The program is assessed through timesharing, which allows for cost savings and for writing the program in a conversational mode. Two sources of input provide flexibility: description of the waste water stream entering the flowsheet selected by the user; and a table of data including 550 parameters representing every possible variable that can affect the design and analysis of a complete chemical-physical treatment system. Setting the framework for a material balance, sizing the unit processes governed by the design criteria, and economic analysis of equipment, operating and installed costs are discussed. Performance of sensitivity analysis on design and process parameters is considered. The CPT Simulation Program is a powerful and necessary tool in the proper analysis of chemical-physical treatment. (Bell-Cornell)
W74-11037

A SYSTEMS APPROACH TO PROBLEM ORIENTED RESEARCH PLANNING: A CASE STUDY OF FOOD PRODUCTION WASTES,
International Research and Technology Corp., Arlington, Va.
For primary bibliographic entry see Field 5G.
W74-11040

WATER AERATION EQUIPMENT,
Gulf Oil Corp., Pittsburgh, Pa. (Assignee)
N. R. Whitaker.
U.S. Patent No. 3,807,712, 3 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1948, April 30, 1974.

Descriptors: *Patents, *Aeration, *Waste water treatment, *Pollution abatement, Water quality control, Water pollution control, Equipment.

A horizontal cylindrical soaker tank has a vertical cylindrical contactor extending upward from it. Within the contactor are a plurality of vertically spaced horizontal discs mounted on a vertical rotating shaft. Surrounding each disc and adapted to intercept water discharged from the edge of the disc is a vertical sleeve. Water delivered onto each disc is either discharged from the outer edge of the disc against the shell sleeve or falls through openings in the disc to a lower disc. Water flowing down the surfaces of the shell and sleeves is contacted by air delivered under pressure into the contactor. Water draining from the sleeves into the soaker is held under pressure in the soaker to give additional time for adsorption of air. (Sinha-OEIS)
W74-11047

PURIFYING PLANT FOR SEWAGE,
J. Bosje.
U.S. Patent No. 3,809,242, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 178, May 7, 1974.

Descriptors: *Patents, *Wastewater treatment, *Aeration, *Sewage treatment, *Activated sludge, *Pollution abatement, Water quality control, Water pollution control, Equipment.

A purifying plant for sewage includes an open topped curved tank having an elongated aerating space so shaped that its end walls are located adjacent to each other. The aerating space is partitioned forming an inner channel enclosed within an outer channel in series so that an endless aerating channel is formed. There is a settling chamber in the inner channel for settling out sludge. (Sinha-OEIS)
W74-11052

SEWAGE TREATMENT APPARATUS,
S. R. Kennedy.
U.S. Patent No. 3,809,245, 5 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 179, May 7, 1974.

Descriptors: *Patents, *Sewage treatment, *Aeration, *Pollution abatement, Water quality control, Water pollution control, *Wastewater treatment, Equipment.

The apparatus comprises a primary liquid circulation chamber in which sewage is circulated around a curved circulation guide barrier that shields an outlet port. Pressurized air is introduced into the chamber. The sludge that is present in the liquid tends to move radially away from the outlet port. The radially moving sludge tends to sink to the bottom of the primary circulation chamber and is drawn outward by suction. Liquid passing through the outlet port enters a flowage chamber, then a second circulation chamber. In the second chamber a scum-collection trough removes the scum floating on the liquid surface. Following secondary circulation the liquid passes into a collection chamber that pools the circulated liquid. The collection chamber includes weirs for skimming a surface layer of the polled water and drainage pipes associated with the weirs for finally removing the skimmed liquid from the sewage treatment apparatus. (Sinha-OEIS)
W74-11053

APPARATUS FOR REMOVING A SUBSTANCE FLOATING AS A LAYER ON THE SURFACE OF A BODY OF LIQUID,
Bertin and Cie, Plasier (France); and Entreprise de Recherches et d'Activites Petrolieres, Paris (France). (assignees)
For primary bibliographic entry see Field 5G.
W74-11057

AERATION DEVICE FOR THE SURFACE AERATION OF LIQUIDS,
J. R. Kaelin.
U S Patent No 3,811,662, 3 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 922, No 3, p 809, May 21, 1974.

Descriptors: *Patents, *Wastewater treatment, *Liquid wastes, *Aeration, Pollution abatement, Water pollution control, Water quality control, Equipment.

The aeration device is distinguished in having its supporting legs at the rotor bearing unit end in fork-form and hinged to a cage-like supporting frame surrounding the rotor bearing unit for height adjustment. The position of the supporting legs can be adjusted relative to the rotor bearing unit. (Sinha-OEIS)
W74-11062

SELECTIVE ADSORPTION OF PHENOLS FROM SOLUTION IN WATER,
Texaco, Inc., New York. (assignee).
F. C. McCoy, and R. C. Schlicht.

Descriptors: *Patents, *Phenols, *Waste water treatment, Pollution abatement, Foam separation, Effluents, Water quality control, Water pollution control.
Identifiers: *Chemical treatment, *Refinery wastes, Polyurethane foam.

To recovery phenolic materials from waste water the steps comprise contacting the waste water with a polyurethane foam in the presence of hydrophilic fibers at a temperature in the range of 35 to 200 deg F for a substantial time. The clarified or purified water may subsequently be drawn out. (Sinha-OEIS)
W74-11063

PROCESS FOR TREATING DOMESTIC AND INDUSTRIAL LIQUID WASTES,
G. M. Chappeil.
U S Patent No 3,812,032, 7 p, 2 fig, 1 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 922, No 3, p 896, May 21, 1974.

Descriptors: *Patents, *Waste water treatment, *Biochemical oxygen demand, Water pollution control, Water quality control, Pollution abatement, *Aeration, Industrial wastes, Liquid wastes, Domestic wastes, Aerobic bacteria, Anaerobic bacteria.
Identifiers: *Chemical treatment.

A process for treating liquid wastes involves adding a sufficient amount of acid formula and an alkaline formula to cause the evolution of heat and the flocculation of solids. The resulting mixture is then aerated during at least a portion of the time period in which heat is evolved. The solids and liquids are separated and recovered. The acid formulae comprise: about 30-98 weight percent aluminum sulfate, about 2-20 weight percent of an alkali metal chloride, and, about 0.0005-0.1 weight percent of sodium or potassium hypochlorite. The alkaline formulae comprise about 10-25 weight percent aluminum sulfate, about 35-60 weight percent sodium aluminate, about 15-35 weight percent sodium hydroxide, about 1-10 weight percent of an alkali metal chloride, about 0.5-4 weight percent sodium or potassium hypochlorite, about 1-7 weight percent alkali metal nitrate, about 0.25-5 weight percent of an alkali metal carbonate, and about 0.25-5 weight percent of an alkali metal bicarbonate. (Sinha-OEIS)
W74-11064

ENGINEERING ASPECTS OF WASTE WATER TREATMENT IN AERATED RING-SHAPED CHANNELS,
Technion - Israel Inst. of Tech., Haifa.
Y. Argaman, and E. Spivak.
Water Research, Vol 8, No 5, p 317-322, May, 1974. 4 fig, 2 tab, 5 ref.

Descriptors: *Treatment facilities, *Oxidation lagoons, *Waste water treatment, *Design criteria, Aeration, Hydraulics, Channel flow, Channel morphology, Oxygenation, Flow rates, Suspended solids, Pumping, Reaeration.

Ring-shaped aerated channels may be used for waste water treatment as oxidation ditches, aerated lagoons, or high-rate ponds. The aerators utilized in these systems provide the necessary oxygen and generate a flow velocity that will keep particulate matter in suspension. When mechanical surface aerators are used, the flow velocity and the oxygen supply rate depend on the channel geometry and the aerator rotation speed and submergence. A design procedure that will simultaneously satisfy oxygen and flow requirements is presented. It involves process kinetics, open-channel flow hydraulics, and aerator performance aspects. Experiments in a pilot aeration channel, operated as a high-rate pond, indicate that the minimum flow velocity for such systems is between 3.5 and 6.5 cm/sec when the suspended solids concentration is about 500 mg/liter. The pumping efficiency of a 70 cm wide cage rotor aerator was about 4% when the submergence depth was 12-17 cm. Calculations show that atmospheric reaeration, induced by high flow velocity, is not economical. On the other hand, a combination of a pump and an aerator may prove feasible in cases where flow velocity rather than oxygen supply is the limiting factor. (Witt-IPC)
W74-11065

MODERN PROCESSES OF SLUDGE DEWATERING (MODERNE VERFAHREN ZUR SCHLAMMENTWAESSERUNG),
A. Wohlfarter.
Wochenblatt fuer Papierfabrikation, Vol 101, No 17, p 624-627, Sept. 15, 1973. 9 fig, 1 tab.

Descriptors: *Treatment facilities, *Pulp wastes, *Sludge treatment, *Dewatering, Pulp and paper industry, Filters, Flocculation.

A general review of sludge dewatering principles and processes and of appropriate equipment, such as vacuum and pressure filters, emphasizes a two-wire dewatering press developed by Andritz Machinery Works of Austria. Some illustrative data are included on the dryness content of the filter cake as a function of press throughput and addition of flocculants in the dewatering of a fine-paper mill sludge. (Speckhard-IPC)
W74-11066

DYNAMIC MODELS AND CONTROL STRATEGIES FOR WASTE WATER TREATMENT PROCESSES,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
J. F. Andrews.
Water Research, Vol 8, No 5, p 261-289, May, 1974. 30 fig, 49 ref.

Descriptors: *Waste water treatment, *Control systems, *Simulation analysis, *Mathematical models, *Computer models, Digital computers, Model studies, Activated sludge, Anaerobic digestion, Operations research, Operating costs, Reliability, Computer programs, Systems analysis.

Consideration of dynamic behavior and the incorporation of modern control systems can lead to substantial improvements in the performance of waste water treatment plants. Other potential benefits include increased productivity, greater reliability, lower operational costs, more stable operation, and faster startups. Several tools are available for the study of dynamic behavior, including dynamic mathematical models, computer simulation, transient response analysis, and process stability evaluation. Simple examples illustrating the theory and use of these tools are presented. The development of a control strategy is intimately related to the dynamic behavior of a process. Some of the basic questions which must be answered in developing a control strategy are given. A wide variety of control algorithms are available for the processing of information for control. A discussion of several of these (on-off, PID, ratio, cascade, and feedforward) is presented, and an examples if given for the application of on-off control to a biological continuous flow stirred tank reactor. Digital computers are also being increasingly used for control of waste water treatment plants, and a discussion of computer control systems is presented. Examples of dynamic models and control strategies for the step-feed activated sludge process and the anaerobic digester are presented and discussed. In addition, dynamic modeling and computer simulations are used to indicate those design and operation factors for the anaerobic digester which are effective in improving process stability. (Witt-IPC)
W74-11069

TECHNICAL AND ECONOMIC ASPECTS OF WATER AND WASTE WATER OZONATION: A CRITICAL REVIEW,
Ebasco Services, Inc., New York. Nuclear Engineering Dept.
S. B. Majumdar, and O. J. Sproul.
Water Research, Vol 8, No 5, p 253-260, May 1974. 1 fig, 4 tab, 40 ref.

Descriptors: *Ozone, *Water treatment, *Wastewater treatment, *Reviews, Oxidation, Disinfection, Color, Taste, Odor, Turbidity, Suspended solids, Biochemical oxygen demand, Chemical oxygen demand, Tertiary treatment, Industrial wastes, Municipal wastes, Potable water, Toxicity, Detergents, Alkylbenzene sulfonates, Bacteria, Viruses.

Practical and economic aspects of water and waste water ozonation are discussed in comparison with other widely used treatment processes. Ozone eliminates color caused by iron, manganese, or by peaty matter, and eliminates taste and odor due to the presence of phenolic substances. Ozone also reduces the turbidity, suspended solids, BOD, and COD of waste waters and is effective in breaking down detergents and other nonbiodegradable surface active agents including alkylbenzene sulfonate. It is also a powerful disinfectant, killing not only pathogenic bacteria, but also inactivating viruses and other microorganisms not as susceptible to ordinary disinfection practices. Ozonation of water costs less than chlorination followed by dechlorination. For tertiary treatment of secondary effluents, ozonation is considerably cheaper than carbon adsorption. Residual ozone in water can be accurately determined by amperometric and photometric methods. Ozone can be easily detected before it reaches the toxic level, and it neither increases the inorganic salt content nor produces any harmful by-products during tertiary treatment. (Witt-IPC)
W74-11070

CONVERSION OF SVEN-PEDERSEN FLOTATION UNITS INTO A HORIZONTAL SCRAPER CONVEYOR-SEDIMENTATION UNIT AT THE MIZIYA PULP AND PAPER MILL (NYAKOI TEKHNICHESKI SOOBRAZHENIYA PO PREUSTROIVANETO NA FLOTATSIONNITE KLETKI 'SVEN PEDERSEN' V K.TS.KH (KOMBINAT TSELULOZA I KHARTIYA MIZIYA ZA RABOTA KATO KHORIZONTAL NI SKREBKOVI UTAITELI),
I. Monev.
Tseluloza i Khartiya (Sofia), Vol 4, No 6, p 28-29 1973. 2 fig.

Descriptors: *Flotation, *Pulp wastes, *Bleaching wastes, *Flocculation, Sedimentation, Pulp and paper industry, Waste water treatment, Water reuse, Fibers(Plant).
Identifiers: Bulgaria, Kraft mills, Straw pulp, Fiber recovery.

A Bulgarian straw kraft pulp mill having two S-flotation units of 1000 cu m/hr total capacity adapted these savealls to the treatment of 500-55 cu m/hr fiber-carrying effluent waters by converting them into a single sedimentation unit for both alkaline wastes (from pulp washing) and acidic effluents (from chlorine bleaching). The two saveall were linked in parallel for even distribution of effluent between them; a baffle plate was mounte

ear the inlet; a scraper conveyor was installed ear the bottom; and a dosage meter for addition f flocculants was included to speed fiber sedi- nentation. Recovered fibers and purified waste vater are reused at the mill. (Stapinski-IPC)
V74-11073

ENVIRONMENTAL POLLUTION THROUGH CHEMICAL PROCESSING OF WOOD UMWELTBELASTUNG DURCH HOLZCHEMISCHE PROZESSE),
For primary bibliographic entry see Field 5B.
W74-11074

FLOCCULATION AND DECANTATION OF PAPER INDUSTRY WASTE WATERS FLOCULATION ET DECANTATION DES EAUX RESIDUAIRES DE PAPETERIE),
C. de Bouille.
La Papeterie, Vol 95, No 9, p 708-712, 715, Sept 1973. 7 fig, 2 tab.

Descriptors: *Waste water treatment, *Pulp wastes, *Flocculation, *Activated sludge, Aeration, Effluents, Pulp and paper industry, Treatment facilities, Waste treatment, Costs, Operation and maintenance, Equipment, Biological treatment, Operating costs, Biochemical oxygen demand, Suspended solids, Sludge treatment, Incineration, Dewatering.
Identifiers: Biomat, Sedimat, Gyro-Sedimat, Biosedimat.

The design and operating characteristics of the 'Sedimat' and 'Biomat' systems for primary and secondary treatment of paper and pulp mill effluents are described and illustrated. The 'Sedimat' is a chemical flocculator-clarifier which removes mainly suspended solids. The 'Biomat' is an activated sludge clarifier capable of removing 80-90% of the effluent's 5-day BOD. Combinations of chemical and biological treatments can be accommodated, e.g., in the 'Biosedimat' and the 'Gyro-Sedimat' system. The latter includes means for surface aeration. Cost data for these installations are included. Sludge handling (dewatering, thickening, and incineration) and reuse in paperboard production are also discussed. (Speckhard-IPC)
W74-11080

EFFLUENT POLISHING WITH A BIOLOGICAL FILTER,
Rilling Road Treatment Plant, San Antonio, Tex.
W. N. Wells.
Deeds and Data (Water Pollution Control Federation), p D1, D7-D8, June 1974. 2 fig, 1 tab.

Descriptors: *Trickling filters, *Filtration, Filters, *Waste water treatment, *Organic loading, *Biochemical oxygen demand, *Suspended solids, Activated sludge, Solids contact processes, Treatment facilities, Equipment, Silica, Porous media, Porosity, Density, Biological treatment, Capillary action.
Identifiers: Foam plastics, Filter media, Surface area.

A simple trickling filter was constructed in 1972 to determine the degree to which effluents from an activated sludge treatment plant could be further stabilized. It was made of a 10ft section of 4ft corrugated iron pipe placed vertically on spaced concrete blocks and filled with a novel filter medium comprising slabs of a porous rigid inorganic silica foam having a density of about 4lb/cu ft and a small pore size such as to impart a surface area of 30,000sq ft/cu ft with 98% voids. The capillary action of this foam was sufficient to maintain a head of 2in of water. Depending on the nature of the influent, the effluent showed BOD reductions of 58.2 to 87.3%, reductions in total suspended solids of 10.6 to 73.6%, and turbidity reductions of 23.3 to 75.6% in three 24-day trial runs at hydraulic loadings of 15 gal/min. (Brown-IPC)
W74-11081

TOTAL OXYGEN DEMAND: A NEW TOOL FOR WASTEWATER ANALYSIS,
Rilling Road Treatment Plant, San Antonio, Tex.
W. N. Wells.
Deeds and Data (Water Pollution Control Federation), p D1, D8-D9, Feb. 1974. 3 fig, 2 tab.

Descriptors: *Oxygen demand, *Biochemical oxygen demand, *Chemical oxygen demand, *Testing procedures, *Instrumentation, *Monitoring, *Waste water treatment, *Treatment facilities, Effluents, Control systems, Automation, Waste treatment, Suspended solids, Solutes.
Identifiers: *Total oxygen demand.

A total oxygen demand (TOD) analyzer is described which continuously monitors changes in oxygen concentration of a gas stream by means of a fuel cell. The operation of this instrument is outlined and illustrated. Tests indicate only a low correlation of TOD data with BOD test results. The TOD test can be valuable in the operation of waste water treatment plants and in special evaluations of substrate biodegradabilities. Being rapid and accurate, it can be used to monitor waste streams. The signal produced could be used to activate alarm systems and to start or stop treatment equipment. Oxidation pond effluents, otherwise difficult to evaluate because of the system's dynamic nature, lend themselves to TOD analyses which can, for instance, differentiate filterable material from soluble matter passing a 4.45 micrometer filter. (Brown-IPC)
W74-11083

VACUUM FILTRATION OF SLUDGE,
Corsicana Water Utilities, Tex.
W. Davis.
Deeds and Data (Water Pollution Control Federation), p D6-D7, D11, Feb. 1974. 2 illus.

Descriptors: *Filters, *Filtration, *Sludge treatment, *Dewatering, *Coagulation, *Treatment facilities, *Equipment, Vacuum drying, Operation and maintenance, Waste water treatment, Waste treatment, Chemicals, Aluminum, Iron compounds, Lime, Polymers.
Identifiers: Aluminum compounds, Coagulants, Ferric chloride, Vacuum, Vacuum filters.

The design of sludge-dewatering vacuum filters and factors affecting their efficient operation are discussed. Filtration rates of sludges can vary considerably, even between similar sludge types at different locations, owing to differences in solids concentration, particle size distribution, and chemical contaminants in industrial waste waters. Nearly all wastewater sludges require chemical preconditioning before dewatering. Most filters in current operation use ferric chloride and lime. Alum, ferric or ferrous sulfate, and aluminum chloride have also been used, and there is recent experimentation with polymeric conditioners. These chemicals act not merely as coagulants but also to loosen water surrounding and entrapped in the sludge particles. The Buchner funnel test serves both to establish feed rates and to determine the required chemical dosages. Proper operation of a vacuum filter requires auxiliary equipment, notably a discharge silencer, a vacuum receiver, an agitator, and chemical storage tanks and feeders. The filter valve and valve disk, sometimes combined, are the heart of the filter. About 25% of the drum area is submerged, and moisture is entrained from the filter cake by an air stream drawn through by the vacuum pump's pressure differential. The best speed for the conditioning tank and filter drum is the slowest one that yields a homogeneous sludge and uniform cake. Any vacuum sufficiently high to pick up and dry the cake is adequate, but a value close to 12in. (30.5 cm) of mercury is preferred. (Brown-IPC)
W74-11084

NEW SWISS SYSTEM FOR SECONDARY TREATMENT IS FIRST IN NORTH AMERICA.
Canadian Pulp and Paper Industry, Vol 27, No 3, p 30-32, March 1974. 4 illus.

Descriptors: *Water conservation, *Waste water treatment, *Pulp wastes, *Wisconsin, *Activated sludge, *Treatment facilities, Sludge treatment, Pulp and paper industry, Dissolved oxygen, Aeration, Aerated lagoons, Centrifuges, Water reuse, Impaired water use, Waste treatment, Dewatering, Suspended solids, Discharge(Water), Costs, Capital costs, Recycling, Microorganisms, Protozoa.
Identifiers: Zurn-Attisholz process, Switzerland, Wisconsin tissue mills(Menasha WI), Deinking mills(Waste paper processing), Tissue papers, Eimco clarifier, Eimco centrifuge, Eimco thickener.

The Zurn-Attisholz (Z-A) two-stage biological (activated sludge) process developed in Switzerland forms the basis for the new effluent treatment facilities installed in Menasha, Wisconsin, by Wisconsin Tissue Mills, a paper producer and reuser of deinked waste papers. Primary treatment is performed in a 450,000-gal capacity 70ft diameter Eimco reactor-clarifier which can remove over 95% of suspended solids after prescreening of coarse matter, such as grit and sand. For secondary treatment, the Z-A system employs three Fuller Suterbilt blowers of 100 hp capable of blowing 2000cu ft/min of air into two equal-sized aeration tanks of 60 x 30 x 17ft (water depth) dimensions. In the first tank, a bacterial mass of 8000ppm is mixed with mixed liquor suspended solids (MLSS) and supplied with 0.5ppm dissolved oxygen. About 200% of incoming flow is recycled from a clarifier basin to the first tank to maintain high MLSS. In the second tank, the MLSS is kept at 2000 ppm and the dissolved oxygen at 2 ppm to assure a predominantly protozoan biomass. Clarified overflow passes to a water reservoir for reuse in papermaking. Sludges are combined and concentrated in Eimco thickeners before dewatering in Eimco centrifuges. Favorable results reported for the nearly two-million-dollar combined installation include, e.g., a 10% reduction in the company's freshwater consumption (from 1.5 to 1.358 million gal/day) in December 1973. Future reductions to less than 750,000 gal/day are expected for effluent discharged to the municipal sewage system. (Witt-IPC)
W74-11085

ACTIVATED CARBON ADSORPTION OF PETROCHEMICALS,
West Virginia Univ., Morgantown.
D. M. Giusti, R. A. Conway, and C. T. Lawson.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 947-965, May 1974. 10 fig, 5 tab, 46 ref.

Descriptors: *Oil wastes, *Activated carbon, *Adsorption, *Waste water treatment, *Organic compounds, Industrial wastes, Wastes, Chemical wastes, Liquid wastes, Oil industry, Solids contact processes, Molecular structure.
Identifiers: *Petrochemicals, Carboxylic acids, Esters, Aldehydes, Ketones, Alcohols, Glycols.

The relative amenabilities to adsorption of 93 compounds encountered in petrochemical wastes were evaluated in single dosage tests. The results showed that the degree to which pure compounds are adsorbed by activated carbon increases as molecular weight increases and polarity, solubility, and branching decrease. Of the classes of compounds studied, the aromatics exhibited the greatest amenability to activated carbon adsorption. The relative amenabilities to carbon adsorption of straight-chain compounds of less than four carbons decreased in the order: undissociated organic acids, aldehydes, esters, ketones, alcohols, and glycols. Single-component isotherm studies with representative compounds from the five functional groupings indicated a petroleum-based

activated carbon possessing low surface acidity to be most effective. Isotherm studies with mixtures indicated that the degree of adsorption of a two-component system could be predicted with only minor downward adjustment from the single-component data. However, data from a four-component system indicated that only about 60% of the anticipated adsorption was realized, suggesting competition for adsorption sites and adverse solubility effects. Extension of isotherm data for pure compounds and mixtures to three continuous systems resulted in greater than 80% attainment of ultimate equilibrium capacities in all cases. (Witt-IPC)
W74-11086

PILOT PLANT STUDIES OF TURBIDITY AND RESIDUAL CELL MATERIAL REMOVAL FROM MILL EFFLUENTS BY GRANULAR MEDIA FILTRATION,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
R. C. Whittemore, and J. J. McKeown.
NCASI Stream Improvement Technical Bulletin, No. 266, May 1973, 33 p. 12 fig, 8 tab, 4 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Filtration, *Filters, Particle size, Treatment facilities, Suspended solids, Turbidity, Biochemical oxygen demand, Coagulation, Sludge disposal, Effluents, Pulp and paper industry.
Identifiers: Granular filters, Kraft mills, Board(Paperboard), Mills, Fine-paper mills.

Three filtration systems were tested at an integrated bleached kraft pulp and paper mill, a boxboard mill, and a fine-paper mill, respectively, as adjuncts to existing effluent treatment facilities. All three systems reduced suspended solids and turbidity by 22 to 50%, and two of the systems achieved solids removals of 90% with addition of chemical coagulants. Only small BOD removals (zero to 15%) were achieved. Although the quality of filtrates will depend on the type of waste water being treated, final effluent containing as little as 10 mg/l of suspended solids and 20 JTU turbidity appears a feasible goal. Disposal of the backwash material remains a problem to be solved. (Buchanan-IPC)
W74-11088

PRELIMINARY LABORATORY STUDIES OF THE DECOLORIZATION AND BACTERICIDAL PROPERTIES OF OZONE IN PULP AND PAPER MILL EFFLUENTS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
R. C. Whittemore, and J. J. McKeown.
NCASI Stream Improvement Technical Bulletin, No. 269, Jan. 1974, 48 p. 19 fig, 9 tab, 60 ref.

Descriptors: *Ozone, *Color, *Coliforms, *Aquatic microorganisms, *Bactericides, *Disinfection, *Pulp wastes, *Bleaching wastes, *Waste water treatment, *Economic efficiency, Costs, Effluents, Pulp and paper industry, Chem-control, Lime, Waste treatment.

The use of ozone as a decolorant and/or disinfectant for raw and treated pulp and paper mill effluents was studied. Per milligram of ozone applied, 15-20 color units were removed from alkaline extraction (bleach plant) wastes, but less than 1 color unit from lime-pretreated effluents. Up to 90% of coliform bacteria can be removed, but large amounts of ozone are needed. Although no strict economic evaluation was made, ozone treatment did not seem to offer cost advantages over other effective effluent decoloring and disinfecting methods. (Buchanan-IPC)
W74-11089

FOCUS ON CONTROL OF WATER POLLUTION IN SAO PAULO STATE AND ITS RELATIONSHIP TO THE PULP AND PAPER INDUSTRIES (ENFOQUE DO CONTROLE DE POLUICOA DAS AGUAS NO ESTADO DE SAO PAULO E SEU RELACIONAMENTO COM AS INDUSTRIAS DE CELULOSE E PAPEL),
C. A. Rameh.
O Papel, Vol 43, No 7, p 35-39, July 1973.

Descriptors: *Governments, *Legislation, *Regulation, *Water pollution control, *South America, *Pulp and paper industry, Pollution abatement.
Identifiers: Brazil, Sao Paulo(Brazil).

Efforts made by the government of Brazil to control water pollution by the paper industry in the state of Sao Paulo are outlined. (Speckhard-IPC)
W74-11090

FLOAT WASH CLARIFIES WHITE WATER FOR PAPER MACHINE RE-USE,
P-A. Akerhagen.
Paper Trade Journal, Vol 158, No 4, p 26-28, Jan 28, 1974. 4 fig.

Descriptors: *Water reuse, *Waste water treatment, *Pulp and paper industry, *Pulp wastes, *Screens, *Fibers(Plant), Water conservation, Water purification, Europe.
Identifiers: White water(Paper machine effluent), Paper machines, Board machines, Tissue machines, Hardboard mills, Fines(Fine fibers), 'Float-Wash' SCREEN, Sweden.

Swedish 'Float-Wash' screens for the purification of paper-machine waste waters have been installed in a hardboard, multiply paperboard, tissue, and waste paper deinking mill. The white water is directed upward against the screen which separates the portion carrying reusable longer fibers from below while removing the portion containing 'fines' (fine fibers) from above. Descriptions and graphic illustrations of the Float-Wash unit are presented, along with flow diagrams. (Hansen-IPC)
W74-11091

DECOLORIZATION OF BLEACH PLANT EFFLUENT AND CHLORIDE HANDLING,
S. Lindberg.
Paper Trade Journal, Vol 157, No 51, p 36-37, Dec 17, 1973. 4 fig, 1 tab.

Descriptors: *Bleaching wastes, *Pulp wastes, *Color, *Ion exchange, *Waste water treatment, *Incineration, Operating costs, Treatment facilities, Europe, Pulp and paper industry, Costs, Chlorides, Waste treatment, Industrial wastes, Water pollution control, Effluents.
Identifiers: Kraft mills, Recovery furnaces, Black liquor, Sweden.

At its kraft pulp and paper mill in Skoghall, Sweden, the Uddeholm Forest Industries Co. is using an ion-exchange system to remove 95% of colored organic matter from bleach plant waste waters. The separated color bodies, essentially free of chlorides, are burned in the mill's black liquor recovery furnace. Some details of the process are indicated. Economic data reveal a net operating cost of $1.44 per ton of softwood pulp (at kappa-number 35) bleached to 90-91% SCAN brightness levels. (Hansen-IPC)
W74-11092

OZONE DECOLORIZATION OF EFFLUENTS FROM SECONDARY TREATMENT,
Wellsbach Ozone Systems Corp., Philadelphia, Pa.
C. Nebel, R. D. Gottschling, and R. J. O'Neill.
Paper Trade Journal, Vol 158, No 5, p 24-25, Jan 28, 1974.

Descriptors: *Ozone, *Waste water treatment, *Pulp wastes, *Costs, *Color, Effluents, Pulp and paper industry, Waste treatment, Economic justification, Economics.

Experimental data indicate that the costs of color removal by ozonation of four different secondary pulp and paper mill effluents range from 2.8 to 6.4 cent per 1000 gal. Methods and economics of ozone generation are described. Generation at the point of use is recommended. (Hansen-IPC)
W74-11095

USE OF THE MULTIROLL PRESS FOR DEWATERING CLARIFIER SLUDGE,
Waplans Mekaniska Verkstads A.B., Vaplan (Sweden).
J. Oledal.
Paper Trade Journal, Vol 158, No 1, p 26-28, Jan 7, 1974. 4 fig, 1 tab.

Descriptors: *Sludge treatment, *Dewatering, *Pressure, Equipment, *Treatment facilities, *Pulp wastes, Operation and maintenance, Operating costs, Costs, Comparative benefits, *Waste water treatment.
Identifiers: Waplan multiroll press, Press rolls, Dewatering presses, Newsprint mills.

Sedimented pulp and paper mill effluent sludge can be dewatered efficiently and economically with the Waplan multiroll press developed by Waplans Mekaniska Verkstads AB. in Sweden. The apparatus consists essentially of four small pressure rolls positioned around a central mother roll in such a way that the space between the latter and the smaller rolls decreases successively from 1 in. at the inlet to 0.25in. at the last press roll. The sludge is fed from a vertical chute into the space between the inlet press roll and mother roll, then forward around the latter through the three subsequent press nips, aided by doctor blades, and ultimately onto an outlet chute. Variables affecting the press performance are discussed. The throughput vs. dry solids correlation is shown for a mechanical sludge from a newsprint mill. An economic comparison between the novel multiroll press and conventional screw presses is made, favoring the former. (Witt-IPC)
W74-11096

WISCONSIN TISSUE EFFLUENT PLANT PIONEERS EUROPEAN PROCESS HERE.
Paper Trade Journal, Vol 158, No 10, p 32-36, March 11, 1974. 3 fig, 4 illus, 1 tab.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, *Activated sludge, *Wisconsin, Pulp and paper industry, Sludge treatment, Dewatering, Suspended solids, Biochemical oxygen demand, Centrifuges, Water reuse, Impaired water use, Water conservation, Industrial water, Waste treatment.
Identifiers: Zurn-Attisholz process, Switzerland, Wisconsin Tissue Mills(Menasha WI), Deinking mills(Waste paper processing), Waste paper, Tissue papers, Eimco clarifier.

Wisconsin Tissue Mills in Menasha, Wisconsin, manufactures paper napkins, table and tray covers, place mats, and similar lightweight paper (tissue) products with reuse of a large proportion of deinked waste paper stock. In the mill's new effluent treatment installation, which started up in Sept. 1973 after two pilot-plant runs for over a year, an Eimco reactor-clarifier achieves primary treatment, followed by a two-stage activated sludge system patterned after the Zurn-Attisholz process developed by Cellulose Attisholz AG. of Switzerland. Clarified primary effluent passes either to the secondary system or to the local municipal sewage treatment plant, or else is bypassed to a storage reservoir. Clarified overflow from the secondary system is reused in the deinking mill or in the paper mill. Sludges from both primary and secondary systems are combined and dewatered in centrifuges. Better than anticipated results are reported for the new treatment installation. Thus, in December 1973, the 5-day BOD averaged 18ppm, and suspended solids 25ppm. Of the 340,117 lb of BOD processed in the new installation, only

5558lb went to the municipal sewage plant, equivalent to 98.1% removal; and of the ,112,492lb of suspended solids processed, only 3352lb were discharged, corresponding to 99.3% emoval. (Witt-IPC)
W74-11097

POLLUTION: FILTERS FOR LOCALIZED PU-RIFICATION (POLLUTION: DES FILTRES POUR UNE EPURATION LOCALISEE).
Papier, Carton et Cellulose, Vol 22, No 7, p 40-41, uly 1973. 1 illus.

Descriptors: *Treatment facilities, *Waste water reatment, Equipment, *Water purification, Filtration, *Filters, Pulp wastes, Pulp and paper ndustry, Effluents, Water conservation, Pollution batement, Water pollution control, Water reuse. dentifiers: Immedium filter, Copefiltre, Upward-low filters.

Descriptions are given of the 'Copefiltre' and Immedium' filter which subject waters and/or vaste waters to multistage filtration in a single ass while the fluid rises upward through filter eds of decreasing granular particle size. Such up-vard-flow filters are being used in the purification f paper industry process water and of paper mill ffluents for recovery and recycling. (Speckhard-PC)
V74-11098

POSSIBILITIES OF USING CHEMICAL-PHYSI-CAL PURIFICATION PROCESS FOR WASTE WATERS (EINSATZMOEGLICHKEITEN CHEMISCHPHYSIKALISCHER REINIGUNG-VERFAHREN BEI RESTABWAESSERN),
. Moergeli.
Das Oesterreichische Papier, Vol 10, No 11, p 18, 0-21, Nov 1973. 4 fig, 3 ref.

Descriptors: *Filters, *Filtration, *Flocculation, Pulp wastes, *Waste water treatment, Treatment acilities, *Monitoring, *Suspended solids, Colloids, Particle size, Turbidity, Waste treat-ment, Pulp and paper industry, Adsorption, Or-anic loading, Polyelectrolytes, Effluents, Silica. dentifiers: White water(Paper machine effluent), Paper mills, Board mills.

After a general review of physical-chemical ef-luent treatment processes applicable to paper in-ustry waste waters, a detailed discussion is resented of the requirements, operating parame-ers, and practical use of solids flocculation plus iltration. The advantage of combining surface fil-ers with volume filters is pointed out. Filtration echnology in the paper industry can serve three rincipally different functions, viz., primary treat-ment for elimination of coarse and fine suspended olids; secondary removal of colloid particles; and ollution monitoring. Examples are given for filter nstallations in a fine-paper mill and in a paper-oard mill. In the first case, 50-60% of organic natter could be removed by filtration. After sub-equent passage through three adsorption columns n series, the clarified effluent contained less than ppm turbidity and less than 40mg/l of organic oading (COD, expressed as permanganate con-umption). In the second case, a chemical floccu-ator removed more than 80% of the suspended olids from board machine effluent. Subsequent iltration eliminated 60% of the remaining uspended solids without additional polyelec-rolyte and up to 95% with addition of 3ppm olyelectrolyte. Monitoring filters should be high-ate, back-washable media, such as siliceous sin-le-layer granular beds with grain sizes between .5 and 5.0mm. (Brown-IPC)
V74-11099

OPERATOR CERTIFICATION PROGRAMS AP-LICABLE TO INDUSTRIALLY OWNED WASTE WATER FACILITIES,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
J. J. McKeown.
NCASI Stream Improvement Technical Bulletin, No 272, Feb 1974. 46 p, 1 fig, 5 tab, 5 ref, 4 ap-pend.

Descriptors: *Industrial wastes, *Waste water treatment, *Treatment facilities, *Operation and maintenance, *State governments, Personnel, *Permits, Engineering personnel, Professional personnel, Scientific personnel, Training, Man-power, Education, Engineering education, Regula-tion, Administrative agencies.
Identifiers: Certification(Of operators).

An assessment of current state certification pro-grams for operators of industrial waste water treatment installations is presented. It reviews state requirements for operator certification and analyzes the procedures by which treatment plants are classed or graded for size and complexity as means of determining the required levels of skill, training, education, and prior experience. State certification programs are viewed as essential for insuring closer supervision of industrial facility performance, since their staffing differs from that of municipal waste treatment plants. (Witt-IPC)
W74-11100

OZONE TREATMENT OF DYE WASTE,
Clemson Univ., S.C. Dept. of Chemical Engineer-ing.
E. H. Snider, and J. J. Porter.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 886-894, May, 1974. 10 fig, 7 tab, 6 ref.

Descriptors: *Waste water treatment, *Industrial wastes, *Dyes, *Ozone, Chemical oxygen de-mand, Color, Water pollution sources, Liquid wastes, Waste water(Pollution), Wastes, Chemical wastes, Chemical degradation, Chemicals, Oxida-tion, Organic compounds, Textiles, Suspended solids, Solutes, Volatility, Hydrogen ion concen-tration.

Textile dye wastes were analyzed for COD, color, total solids, volatile solids and dissolved solids be-fore and after they were treated with ozone at three pH levels. In general, ozone reduced the COD, but the extent of reduction varied from 8 to 55%, depending on the nature of the dye waste. Ozone dramatically reduced the color of the dye wastes, but measurements were affected by high turbidity. As a treatment process, it seems that the best use of ozone in treating dye waste is as a final polishing step following conventional treatment. (Witt-IPC)
W74-11101

USE OF OZONE AND OXYGEN IN ADVANCED WASTE WATER TREATMENT,
W. R. Grace and Co., Baltimore, Md. Pollution Control Systems.
H. M. Rosen.
Journal of the Water Pollution Control Federation, Vol 45, No 12, p 2521-2536, Dec 1973. 13 fig, 2 tab, 17 ref.

Descriptors: *Oxygenation, *Ozone, *Oxygen, *Operating costs, *Capital costs, *Costs, *Comparative costs, *Waste water treatment, Treatment facilities, *Aeration, Equipment, Waste treatment.

The on site production of oxygen by either cryogenic means or pressure swing separation is economical for oxygen aeration systems requiring more than 40t/d (34,280kg/d) of oxygen. At this level, the generation costs are ca. $15/ton ($16.55/1000 kg). Ozonization can achieve signifi-cant reductions of COD (to less than 15mg/l) and of BOD (to near-zero) with initial ozone dosages of 0.7-3.0mg per mg/l of COD. Among several ozone generation methods available, the Lowther plate requires only 2.5-3.5kWh/16 (5.5-7.7kWh/kg) of oxygen to produce 1% ozone. Capital costs for ozone generators run from $80 to $100/lb ($176-220/kg) of daily capacity with oxygen as the feed gas. Operation with air doubles the capital and operating costs. (Witt-IPC)
W74-11103

PROTOTYPE STUDY OF MICROSTRAINING AT A PAPER MILL COMPLEX,
Camp, dresser and McKee, Boston, Mass.
A. E. Rimer.
Journal of the Water Pollution Control Federation, Vol 45, No 12, p 2567-2576, Dec 1973. 7 fig, 6 tab.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, *Pulp and paper indus-try, *Massachusetts, *Filtration, Pumps, Pump-ing, Filters, Biochemical oxygen demand, Suspended solids, Coagulation, Flocculation, Sludge treatment.
Identifiers: Microstrainers.

Strathmore Paper Co. and Esleeck Manufacturing Co., located next to each other in Turner Falls, Mass., have constructed a joint industrial waste treatment plant and operated it for more than a year. The facility comprises two microstrainers preceded by coagulation and flocculation stages. It provides equivalent secondary treatment for an average of 1.8 million gal/d (6900cu m/d) of waste waters from both mills. Some problems were en-countered with microstrainer seals, effluent pumps and associated controls, and the sludge pumps. Operating efficiencies were analyzed to show average removals of 95% of suspended solids (67,000lb or 3000kg/d) and 80% of 5-day BOD. (Witt-IPC)
W74-11104

REVERSE OSMOSIS SEPARATION OF SOME HEAVY METALLIC SALTS IN AQUEOUS SOLUTION (IN JAPANESE),
S. Ishizaka.
Journal of the National Chemical Laboratory for Industry (Tokyo Kogyo Shikensho Hokoku), Vol 68, No 11, p 437-441, Nov 1973, 2 fig, 5 tab, 8 ref. English summary.

Descriptors: *Reverse osmosis, *Membrane processes, *Waste water treatment, *Heavy metals, Zinc, Manganese, Cadmium, Copper, Nickel, Sulfates, Chlorides, Cations, Anions, Sodium chloride, Flow rates, Cellulose, Tempera-ture, Copper sulfate, Copper compounds, Water purification, Industrial wastes, Separation techniques.
Identifiers: Cellulose acetate.

The removal of Zn, Mn, Cd, Cu, and Ni sulfates and chlorides by reverse osmosis through Loeb-type cellulose acetate membranes (cured at 75C and 80C) was studied in comparison with NaCl re-jection rates. At water fluxes of 0.9-1.05cu m/sq m/d, rejection rates of 93-98.7% were obtained. More than 99.7% of heavy metal sulfates were removed by the membrane that had been cured at 80C when fluxes were below 0.8cu m/sq m/day. (Brown-IPC)
W74-11105

TREATMENT OF ALKALI EXTRACTION EF-FLUENTS BY ULTRAFILTRATION (TRAITEMENT DES EFFLUENTS DE SODA-TION PAR ULTRAFILTRATION),
Centre Technique de l'Industrie des Papiers, Car-tons et Celluloses, Grenoble (France).
M. Pichon, E. Muratore, and P. Monzie.
Revue A.T.I.P. (Association Technique de l'Industrie Papetiere), Vol 28, No 1, p 9-15, 1974. 5 fig, 9 tab, 7 ref.

Descriptors: *Filtration, *Waste water treatment, *Reverse osmosis, *Bleaching wastes, *Membrane processes, *Pulp wastes, Waste treat-ment, Industrial wastes, Pulp and paper industry, Organic loading, Suspended solids, Biochemical

oxygen demand, Chemical oxygen demand, Color, Flow rates, Temperature, Pressure, Costs, Operating costs, Economics, Recycling, Water reuse, Alkalinity.
Identifiers: *Ultrafiltration, Multistage processes.

Effluents from the alkaline extraction stages of two kraft pulp bleach plants were subjected to ultrafiltration in experiments designed so as to study the influence of process parameters on purification efficiencies. At low concentrations of contaminants, the reduction of pollution loads (BOD, COD, color, and dry solids content) was not significantly affected by operating temperature, pressure, and flux rates, although these variables did affect the permeability of the ultrafiltration membranes. At concentration factors up to four, ultrafiltration reduced the BOD by 46%, the COD by 76.5%, the color by 87%, and the dry solids by 56% on the average. The quality of ultrafiltrates decreased with increasing concentration. At factors above 10, some fractions of the ultrafiltrate showed pollution loads exceeding those of the influents. Since the load could be reduced by a second-stage ultrafiltration, a multistage process is recommended for industrial operation. Present operating costs are rather high, but improvements expected with further R and D work could make ultrafiltration an economically viable process for recycling of pulp and paper mill effluents. (Stapinski-IPC)
W74-11114

FIRST REVIEWS FAVORABLE FOR NEW ROTARY DISC BIOLOGICAL SYSTEM,
M. MacLeod.
Pulp and Paper, Vol 47, No 13, p 54-56, Dec 1973. 3 fig, 1 tab.

Descriptors: *Biodegradation, *Pulp wastes, *Treatment facilities, Equipment, Aerobic treatment, *Waste water treatment, Waste treatment, Biochemical oxygen demand, Sludge, Energy, *Biological treatment.
Identifiers: Bio-Surf process, Autotrol Corp(Milwaukee WI).

The Bio-Surf process developed by Autotrol Corp. (Milwaukee, WI) proved itself capable of competing with aerated biological treatments of pulp and paper mill effluents. Industrial trials confirmed that the process requires less energy, yields a high-solids sludge, and has good resistance to shock loadings. The basic module used is a 25ft long horizontal shaft carrying 250 corrugated polyethylene discs of 12ft diameter which rotate in a vat. A fixed aerobic biomass forms on the disc surfaces. Process variables and capital and operating costs are discussed. Pilot-plant trials are described, in which BOD removals as high as 98% are claimed. (Hansen-IPC)
W74-11115

A NOVEL DEVICE FOR IMPROVED AIR AND LIQUID MIXING (UJTIPUSU KESZULEK FOLYADEKOK ERINTKEZTETESERE ES KEVERESERE LEVEGOVEL),
Z. Nagy, A. Kovacz, J. Rauschenberger, and G. Hupka.
Magyar Kemikusok Lapja, Vol 18, No 11, p 560-565, 1973. 6 fig, 1 tab, 16 ref.

Descriptors: *Fermentation, Sewage, *Sewage treatment, Industrial wastes, *Aerobic treatment, *Aeration, *Waste water treatment, Oil wastes.
Identifiers: Silty sewage.

In silty sewage purification processes, industrial aerobic fermentation processes, and in purification of industrial waters containing emulsified oil or fat, it is necessary to provide an intensive contact between the air and the agitated liquids which contain large quantities of dispersed particles. According to a new process, the potential energy of the air introduced through the bottom of the vertical tubes immersed in the liquid is used for the intensive agitation of the liquid. The material transfer rate (1 to 5 kg 02/cu m hour in the sodium sulfite solution) obtainable in the equipment designed in this way depends not only on the quantity of air, but also on the velocity distribution obtained as a result of liquid agitation. (Murphy-FIRL)
W74-11116

POLYELECTROLYTES AS PRIMARY COAGULANTS FOR POTABLE WATER SYSTEMS,
Topeka Water Dept. Kans.
For primary bibliographic entry see Field 5F.
W74-11117

MARKETS FOR CHEMICALS GROW AND GROW,
Cleveland State Univ., Ohio.
A. C. Gross.
Environmental Science and Technology, Vol 8, No 5, p 414-418, May, 1974. 1 fig, 2 tab.

Descriptors: *Costs, *Chemicals, *Wastewater treatment, *Water treatment, Costs, Coagulation, Membranes, Polyelectrolytes, Lime, Ion exchange, Resins, Filters, Forecasting, Hydrogen ion concentration.
Identifiers: Economic markets, Manufacturers.

Markets for chemicals in the antipollution field are discussed. Although inflation will raise costs of chemicals by perhaps 15% by 1980, growth of water and waste water treatment chemicals is expected to exceed the growth rate of the economy. Specific chemicals will significantly increase. Polyelectrolytes should grow more rapidly than inorganic coagulants, membranes faster than other filter media, ion exchange resins faster than lime, and oxygen should be used more widely than air. The industry is fragmented; six specialty firms control almost half of the formulations. Chemical filter materials, pH neutralizers and salts, biological action chemicals, and internal water preparations are discussed. A larger market is forecast for waste water treatment chemicals than water treatment, but both markets will increase. (Prague-FIRL)
W74-11118

PLASTIC VALVES STAND UP TO CHLORINE.
For primary bibliographic entry see Field 5F.
W74-11123

SOME CURRENT PAPER INDUSTRY ENVIRONMENTAL PROTECTION PROBLEMS,
National Council of the Paper Industry for Air and Steam Improvement, Inc., New York.
I. Gellman.
Paper Trade Journal, Vol 158, No 13, p 28-30, April 1, 1974.

Descriptors: *Energy, *Management, *Pulp wastes, *Waste water, *Bark, Effluents, Technology, Sulphite, Chemicals, Costs, Pulp and paper industry, Lime, Precipitation, Reviews.
Identifiers: Zero pollution discharge, Color detectability, Pulping liquors.

Reviewed are problems relating to three aspects of energy and management. These are: the recovery of energy from materials such as bark and spent pulping liquors which were once considered wastes; the efficient use of energy in managing waste water, atmospheric emissions, and solid wastes; and the harnessing of natural energy for the dispersal of effluents and emissions. Trends towards incineration of various semi-chemical and acid spent sulphite liquors have been due to both technology and the comparison of heat and chemical recovery costs within the paper industry. Aspects discussed include current kraft process studies, spent sulphite liquor studies, bark burnings, innovative industry approaches, high energy use by precipitators, lime kiln and sludge problems, sludge handling, and organic load and decolorization. In addition, zero pollution discharge, color detectability in surface waters, and the need for year round treatment are mentioned. Study of reliability of regional dispersion models, degree of further refinement, and control of operations is recommended. (Prague-FIRL)
W74-11126

FEASIBILITY OF WATER REUSE AT HIGHWAY REST STATIONS,
Virginia Highway Research Council, Charlottesville.
C. E. Parker.
Journal of the American Water Works Association, Vol 66, No 4, p 247-249, April, 1974. 4 tab, 9 ref.

Descriptors: *Water reuse, Effluents, *Costs, *Waste water treatment, Water quality, Phosphorus, Organic carbon, Aeration, *Recycling.
Identifiers: *Flush toilets, *Highway rest areas.

A study was made of the current effluent quality from an existing rest station, the treatment required to upgrade the waste water from the rest area for recycle, the requirements of the rest area, and the response necessary for a recycle system to meet peak demands. Water use was correlated with rest area use and traffic flow. Waste water was examined from an area employing an extended aeration system and a holding pond, and evaluated regarding requirements for toilet flushing at peak needs. It appears that by changing the flow scheme and storage and disinfection scheme, the present effluent could be used for flushing toilets. Capital costs were compared with the necessary system for effluents which are free from phosphorus and low in organic carbon. This recycling alternative would save about $35,000 per rest area. On a test basis, it is indicated that waste water reuse for flushing toilets at highway rest areas offers an alternative to releasing high-quality effluent to a stream. Further demonstration projects are needed. (Prague-FIRL)
W74-11134

THE DIRECT REUSE OF RECLAIMED WASTEWATER: PROS, CONS, AND ALTERNATIVES,
Carollo (John) Engineers, Walnut Creek, Calif.
W. J. Phillips, II.
Journal of the American Water Works Association, Vol 66, No 4, p 231-237, April 1974. 9 tab, 21 ref, 1 photo.

Descriptors: *Water reuse, *Reclaimed water, *Waste water treatment, Impaired water use, Sewage treatment.

With the supply of water decreasing and need increasing, there is growing interest in reuse of wastewater to supplement water supplies. Despite the apparent success of several existing reclamation projects there is evidence that the use of reclaimed wastewater in domestic water supplies may not be as safe as it should be. A comparison of arguments and research data by both proponents and skeptics of water recycling is presented. While several studies indicate that some existing treatment processes are capable of producing a high quality effluent, the effectiveness of present operating processes diverges widely. Developing reliable systems and adequate monitoring techniques are two major problems. The immediate implementation of recycling is not necessary. Further study is needed to determine effluent quality standards required for safe recycling. Alternative approaches to water and wastewater management, such as water salvage and conservation measures, should be developed to allow time for further investigation into all aspects of wastewater reuse. (Deckert-Florida)
W74-11153

URIFICATION OF WATER POLLUTED WITH DT AND HEXACHLOROCYCLOHEXANE,
editsinskii Institut, Saratov (USSR).
V. Shtannikov.
g Sanit. Vol 37, No 9, p 97-99, 1972. Illus.

escriptors: *DDT, *Filters, Coagulation, Sand.
entifiers: BHC, Lindane, Hexachlorocycldhexe.

rification of water contaminated with hexhlorocyclohexane and DDT at up to 10 times the aximum allowable dose was analyzed with agulants, flocculants and active filtering agents. e use of Al2(SO4)3 or Fe2(SO4)3, even in high ncentrations was not successful. Increasing the I by adding Na2CO3 or additional filtering rough sand substantially improved the results of agulation techniques. The effect of polyacrylade depended on the dose of the reagent. Comed use of Al2(SO4)3, polyacrylamide and filterg through sand provided high degrees of purity. alysis of current 'barrier functions' of water puication plants using Al2(SO4)3, settling, filtering rough sand and chlorination showed limited sults. Out of filtering materials tested, ionites re more effective than active C. Ion-exchange lymers were fairly effective; silica sand was infective.--Copyright 1974, Biological Abstracts, c.
74-11183

YNAMICS OF THE UTILIZATION OF ORANIC POLLUTANTS IN WASTE WATER OF IE OLAINE CHEMICAL-PHARMACEUTIAL PLANT BY THE HETEROTROPHIC OCOENOSIS OF ACTIVE SILT, (IN RUSAN),
esoyuznyi Nauchno-Issledovatelskii Khimikormatsevticheskii Institut, Moscow (USSR).
A. Luganskii, and V. G. Mitereva.
him Farm Zh. Vol 6, No 5, p 40-41, 1972. Illus.

escriptors: *Activated sludge, *Organic matter, Vastewater treatment.

laptation of spontaneous microflora to water llution was rapid. Heterotrophic microorgans appeared as small flakes of active silt by the cond day. Massive development of flagellates as also observed by the third day. The amount of gellates decreased by the 19th day indicating the fective utilization of organic substances by the ocoenosis of active silt.--Copyright 1974, Biolgl Abstracts, Inc.
74-11184

NALYSIS OF LIGHTWEIGHT OIL CONTAINENT SYSTEM SEA TRIALS,
ydronautics, Inc., Laurel, Md.
r primary bibliographic entry see Field 5G.
74-11224

L-WATER REGENERATIVE SEPARATOR--NAL REPORT OF PHASE I DEVELOPMENT OGRAM OF A CONTINUOUS REGENERATG MOVING BED TO REMOVE OIL FROM L-WATER SUSPENSIONS,
ydronautics, Inc., Laurel, Md.
E. Witmer, and A. Gollan.
vailable from NTIS, Springfield, Va 22161 as OM-72-11041, Price $3.00 printed copy; $2.25 crofiche. Technical Report No 7080-1, October 71. 128 p, 38 fig, 11 tab. MARAD Contract C-0-467.

escriptors: *Filtration, *Filters, *Oily water, Vater pollution control, Oil pollution, Ships, nulsions, Separation techniques, Sea water, Vaste water treatment.
entifiers: Polyurethane filters.

lter media were tested for use in a continuous nerating moving bed process for clarifying oily llast waters. Media investigated includes materials ranging from glass, porous ceramics, metals, wools, plastics, activated carbon, anthracite, in the form of discrete beads or irregular granules, fibrous non-woven mattings and reticulated (open-pore) foams. A partially compacted bed of randomly oriented pieces of an open structured polyurethane foam does an excellent job of scavenging a wide variety of oil contaminants, including both crude and Bunker 'C' types. The resilient nature of this material facilitates reuse by pressing spent media. (Knapp-USGS)
W74-11225

FLOCCULATION OF AQUEOUS QUARTZ SUSPENSIONS WITH NEUTRAL AND CATIONIC POLYMERS IN THE PRESENCE OF CO(II), CA(II), OR FE(III),
Natal Univ. Pietermaritzburg (South Africa). Dept. of Science.
E. A. Appleton.
Available from NTIS, Springfield, Va 22161 as PB-222 026, Price $9.50 printed copy; $2.25 microfiche. South Africa Council for Scientific and Industrial Research Pretoria, Chemical Engineering Research Group, Special Report CENG 004, March 1973. 159 p, 40 fig, 5 plate, 21 tab.

Descriptors: *Flocculation, *Suspension, *Water treatment, Suspended load, Hydrogen ion concentration, Separation techniques, Cations, Zeta potential, Polymers, Adsorption, *Waste water treatment.

Flocculation of quartz suspensions by polymers was studied over the pH range 2 to 11. When quartz suspensions contain only monovalent alkali metal cations in solution, the neutral polyacrylamide polymer adsorbs onto the particles via hydrogen bonds to isolated undissociated surface silanols. Flocculation is caused by polymer bridging and is dependent on adsorption which decreases with increasing pH. Adsorbed polyacrylamide has no effect on the negative zeta potential of the particles. Polyvalent metal cations such as Co(II), Ca(II), or Fe(III) adsorb on quartz particles by ion exchange with protons from surface silanols. This chemisorption changes the negative zeta potentials to more positive values having maxima which are characteristics of the cation species and their equilibrium concentrations. When quartz particles have positive surface sites due to the chemisorbed Co(II), Ca(II) or Fe(III) ions the suspensions are flocculated more effectively by polyacrylamide, at any pH value, than in the absense of these cations. In addition, the zeta potential of the flocculated particles is much less negative. The cationic quaternary ammonium polymer is adsorbed on quartz due to electrostatic attraction and the zeta potential of the particles becomes less negative. The more negative zeta potential of the particles at high pH increases the electrostatic attraction and results in better flocculation. When Co(II) or Ca(II) ions are added to quartz suspensions the cationic polymer causes flocculation provided there are still surface sites available for the ionic bonding of this polymer. However, Fe(III) ions (at low pH values) prevent flocculation by this polymer. (Knapp-USGS)
W74-11235

EFFECTS OF SPREADING MANURE ON GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-11240

A BEEF CONFINEMENT BUILDING WITH AN OXIDATION DITCH,
Illinois Univ., Urbana. Agricultural Experiment Station.
D. B. Bauling, W. D. Boston, and D. L. Day.
Presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973. 12 p, 10 fig.

Descriptors: *Confinement pens, *Oxidation lagoons, *Cattle, *Farm wastes, *Waste storage, Design, Foaming, Ammonia, Odor, Aeration, Lagoons, Aerated lagoons, Farm lagoons, Recycling, *Waste water treatment.
Identifiers: *Recirculating system, Slotted-floor pens, Aerobic lagoons.

A new cold-confinement unit for beef cattle was placed in operation on November 30, 1972 at the Beef Research Farm on the Urbana-Champaign Campus of the University of Illinois. The unit was designed to receive the animal waste, aerate it for odor control and decomposition, concentrate it for storage, and finally eliminate it from the system. The unit features a totally slotted floor, an oxidation ditch, a mechanically aerated settling lagoon, and an aerobic holding lagoon. All of these are tied together in a continuous recycling system designed to dispose of all the waste without the need to clean the oxidation ditch. The experiment has shown that removal or replacement of cattle, changes in animal diets, variations in dilution or aeration rates, and changes in temperature can all adversely affect the operation of the system. Design considerations, operational problems, and general observations are given. (Cartmell-East Central)
W74-11241

SOIL COLUMNS FOR SIMULATING ANIMAL MANURE RECYCLING,
McGill Univ., Montreal (Quebec). Dept. of Agricultural Engineering.
J. R. Ogilvie, and B. P. Warkentin.
Presented.at 66th Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, Paper No. 73-429, 13 p, 4 fig, 2 tab, 7 ref.

Descriptors: *Farm wastes, *Recycling, *Soils, *Waste disposal, Denitrification, Degradation(Decomposition), Chemical properties, Physical properties, Biological properties, Microorganisms, Drainage, Water, Ions, Chromatography, Chemical oxygen demand, Slurries.
Identifiers: *Soil columns, *Animal manure, Loading rates, Detention time, Flux, Carbonaceous slurry.

Soil columns were used in two studies considering applications of carbonaceous slurry material for soil recycling. The soil columns were found to be useful guides to the effect of manure recycling on soils. Since microbial denitrification and degradation of the applied manure was desired, the study of detention time was of major importance, as was maximum loading of manure slurry. The study of the flux of different solutions through the soil was instrumental in deriving response curves for these experiments. (Frantz-East Central)
W74-11242

REDUCING LABOR DURING BROILER GROWOUT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Agricultural Extension Service.
W. D. Weaver, Jr.
Poultry Digest, Vol 32, No 382, p 538-540, December, 1973. 6 fig.

Descriptors: *Automation, *Litter, *Farm wastes, *Labor, Cleaning, *Virginia, *Poultry, Farm wastes, Waste treatment.
Identifiers: *Broiler growout, Spreading, Feeder lids, Water jugs.

In Virginia, observations were made on tasks such as getting new litter in and old litter out of the poultry house and on filling and cleaning feeder lids and water jugs. New litter is normally delivered to the house in trucks that can be automatically unloaded. Chain-bottomed trucks can spread the litter in a windrow through the center of the house. From experiments, it has been found that just as good a start can be obtained without

water jugs, providing that at least four eight-foot, shallow, 'V' water troughs are supplied per 1,000 birds. Filling feeder lids is still done by wheelbarrow and coal bucket. One grower in central Virginia used a motorcycle-powered cart. Because of the increasing cost of new litter material, most companies today are practicing a built-up litter program. Under this program, houses are cleaned out once a year. Clear span houses lend themselves best to automated cleanout, although houses with posts can be adapted to most automation. Remodeling can save labor when properly done. (Drewry-East Central)
W74-11243

MORE BEEF ON THE HOOF GOAL OF OHIO RESEARCH.
Feedlot Management, Vol 15, No 11, p 22-24, November, 1973.

Descriptors: *Ohio, Research, *Cattle, *Productivity, *Farm wastes, Recycling, Protein, Feeds, Optimization, Breeding, Waste treatment.
Identifiers: Beef, Crossbreeding, Ralgro, Selenium, Shipping fever, Diethylstilbestrol.

Research on crossbreeding, wastes, protein, Ralgro, selenium and shipping fever has been conducted by animal sceintists at the Ohio Agricultural Research and Development Center. The goal was to produce animals that manufacture quality beef as quickly and efficiently as possible. A crossbreeding project was established in 1970 to help identify the importance of breeding alternatives. The mating scheme was designed to produce straightbred Angus and Charolais cow herds. Results showed Angus calves were smaller at birth, but had a higher rate of survival and higher conformation scores at weaning. They produced more pounds of calf per unit of metabolic size than any other crosses. Feeding animal wastes has potential in starter rations for fat cattle or in rations for brood cows or ewes. Feeding trials, including protein withdrawal, have proved animals to require supplemental protein until calves weigh between 760-790 lbs. Then supplement protein can be discontinued. Three trials involving 100 heifers and 300 steers showed the performance of DES-treated cattle. Blood analyses indicated the selenium content of whole blood was increased 56 days following selenium injection. Research is still being done on selenium injections. Smith and Preston revealed a theory that protein might be a factor in shipping fever; however, results of the study were inconclusive. (Drewry-East Central)
W74-11244

FECAL ELIMINATION OF ESTROGENS BY CATTLE TREATED WITH DIETHYLSTILBESTROL AND HEXESTROL,
Purdue Univ., Lafayette, Dept. of Animal Science.
For primary bibliographic entry see Field 5B.
W74-11245

POULTRY ANAPHAGE IS HERE TO STAY,
Michigan State Univ., East Lansing. Coll. of Agriculture and Natural Resources.
H. C. Zindel.
Egg Industry, Vol 6, No 7, p 22 July 1973. 2 fig, 5 ref.

Descriptors: Poultry, *Farm wastes, *Feeds, *Recycling, Productivity, Fertility, Calcium, Phosphorus, *Waste treatment, Waste disposal, Dehydration.
Identifiers: *Dried poultry wastes, Hatchability, *Poultry anaphage.

On the basis of research, feed costs, and feed ingredient availability, dried poultry and livestock feed. A 12.5 to 25 percent dried poultry waste diet replacement in poultry feeding over a 14 month period caused no change in production, fertility, or hatchability, and no discernible difference was revealed by necropsy. Potential poultry waste sales outlets are livestock and poultry feeds, mushroom culture media, and organic fertilizers. Since phosphorus and calcium were found to increase in recycling, feeding of dried poultry waste as a diet replacement should not exceed 25 percent. Keys to successful poultry waste dehydration are: (1) operation economy and ease, (2) packaging unity, (3) low service and maintenance costs, (4) emission control, (5) consistent and uniform production, (6) efficient continuous operation, and (7) compliance with EPA odor, smoke, and particulate standards. (Hargrove-East Central)
W74-11246

PURIFICATION PLANT EUTIN, APPLICATION OF SIMULTANEOUS PRECIPITATION FOR PHOSPHATE ELIMINATION, (KLAERANLAGE EUTIN, ANDWENDUNG DER SIMULTAN-FAELLUNG ZUR PHOSPHATELIMINIERUNG,),
K. Mudrack, and G. Stobbe.
Wasser Luft und Betrieb, Vol 18, No 5/6, p 289-292, 1974. 4 fig, 2 tab, 2 ref.

Descriptors: *Phosphates, *Precipitation, *Iron compounds, Sludge treatment, Biochemical oxygen demand, *Waste water treatment.
Identifiers: *Iron sulphate, *Germany(Eutin).

In the city of Eutin, Germany, treating the sewerage of a population of over 17,800, waste water from a military caserne, a police training camp, and the usual small trade, the possibilities of phosphate-elimination and of influencing the sludge index by addition of iron sulfate into the activation basin were studied. This was done both in the laboratory and in practical operation of the city's mechanical-biological treatment plant. Amounts of 16g Fe/cu m and 46g/cu m were added. Phosphate elimination rates of about 80 to 90 percent were achieved, leaving a residual concentration of 2 to 5mg/liter of phosphate. The sedimenting properties of the sludge were improved and the volume of surplus sludge was reduced. The purification efficiency of the plant, as measured by BOD and KMn04 consumption, was improved. (Shaffer-FIRL)
W74-11247

THE EFFECT OF SURPLUS ACTIVATED SLUDGE IN FILTER PRESS PERFORMANCE,
Mansfield Sewage Works (England).
C. E. Brade, and N. E. W. Sambidge.
Water Pollution Control, Vol 73, No 2, p 138-149, 1974. 10 fig, 7 tab, 6 ref.

Descriptors: *Sludge treatment, *Dewatering, *Activated sludge, Treatment facilities, Digestion, Filters, *Waste water treatment.
Identifiers: Elutriation, United Kingdom(Mansfield-Eng).

Experiments to press raw primary and humus sludge, raw mixed sludge which contains surplus activated, digested mixed sludge, and elutriated digested mixed sludge are recounted. Test results led to the following conclusions: raw primary/humus sludge was readily dewatered using batch conditioning techniques; the poor cakes were due to aging after addition of the conditioner; raw mixed sludge could be pressed more satisfactorily using an in-line conditioning system when proportions of activated sludge were not high; and, the mixed sludge, after digestion and elutriation, was easily pressed in a short time and gave excellent cakes. (Sandoski-FIRL)
W74-11248

INVERSE SEPARATION OF HEAT-TREATED SLUDGE,
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Mechanical Engineering.
C. Rotsides, and J. G. Everett.
Water Pollution Control, Vol 73, No 2, p 210-213, 1974. 6 fig, 7 ref.

Descriptors: *Sludge treatment, *Heat treatment, Air entrainment, Settling, Laboratory tests, *Waste water treatment.
Identifiers: *Floating sludge.

An examination of the problem of floating sludge was undertaken with experiments showing that agitation and air entrainment of heat-treated sludge may play a part in causing sludge to float. It was found that the amount of floating sludge is not influenced by either temperature or period of heat treatment but that solids concentration does have a pronounced effect on the settling of the sludge. Continuous operation of the decanter also may influence sludge floating. (Sandoski-FIRL)
W74-11249

THE EFFECT OF HEAT TREATMENT ON THE SOLUBILIZATION OF HEAVY METALS, SOLIDS AND ORGANIC MATTER FROM DIGESTED SLUDGE,
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Mechanical Engineering.
J. G. Everett.
Water Pollution Control, Vol 73, No 2, p 207-209, 1974. 4 tab, 9 ref.

Descriptors: *Heat treatment, *Sludge treatment, *Heavy metals, *Solubility, Nitrogen, Fertilizers, Organic matter, Zinc, Copper, Nickel, Chromium, Lead, Sludge digestion, Solid wastes, *Waste water treatment.

The effect of heat treatment on the solubility of five metals and other digested sludge components has been investigated. Nitrogen was found to be more soluble than most sludge components and metals were found to be the least soluble. This has important implications for the use of the liquor as an agricultural fertilizer. The liquor solids averaged 12 percent of the toxicity of the sludge. For equal applications of nitrogen the liquor was only six percent as toxic as the sludge. (Sandoski-FIRL)
W74-11250

A STUDY OF CONDITIONING SEWAGE SLUDGES WITH LIME,
L. J. Webb.
Water Pollution Control, Vol 73, No 2, p 192-206, 1974. 7 fig, 7 tab, 12 ref.

Descriptors: *Sludge treatment, *Sewage sludge, *Lime, Efficiencies, Investigations, Liquids, Solids, *Waste water treatment.
Identifiers: *Lime conditioning, *Copperas.

The following two project objectives were investigated with respect to lime treatment of sewage sludges: to understand further the mechanism of lime conditioning of sewage sludges with a view to improvements in process efficiency and to compare various lime conditioning systems on a variety of sludge types. Lime with copperas was the most effective conditioning system on typical examples of primary, digested, and activated sludges. There is a much larger variation in the liquid phase lime demand than in the solid phase demand. The great efficiency of lime in conditioning primary sludges is attributed to its interaction with the fat/grease content of the sludge. (Sandoski-FIRL)
W74-11251

FACILITIES FOR CONTROLLING THE ACTIVATED SLUDGE PROCESS BY MEAN CELL RESIDENCE TIME,
Yoder-Trotter-Orlob and Associates, Walnut Creek, Calif.
M. E. Burchett, and G. Tchobanoglous.
Journal Water Pollution Control Federation, Vol 46, No 5, p 973-979, May 1974. 7 fig, 6 ref.

Descriptors: *Activated sludge, *Treatment facilities, *Control systems, Automatic control, Operation and maintenance, *Waste water treatment.
Identifiers: *Mean cell residence time.

Several methods now being used by operators to control the activated sludge process are discussed. The use of the mean cell residence time (MCRT) is recommended as the most suitable operational control parameter. The basic concepts involving the theoretical and practical reasons for controlling the MCRT are discussed. The physical features of a control system developed to use this method are presented. The following advantages for the proposed control system are: minimum required operator attention, inexpensive capital costs, more positive process control, and more stable process operation. (Sandoski-FIRL)
W74-11254

WATER AND EFFLUENT INSTRUMENTATION MADE SIMPLE,
Taylor Instrument Companies, Rochester, N.Y.
For primary bibliographic entry see Field 5A.
W74-11258

SEDIMENTATION: AN INTRODUCTION TO SOLIDS FLUX THEORY,
Sheffield (England). Water Pollution Control Dept.
J. Handley.
Water Pollution Control, Vol 73, No 2, p 230-240, 1974. 10 fig, 17 ref.

Descriptors: Reviews, Design criteria, Operations, *Sedimentation, Mathematical studies, Theoretical analysis, Application methods, Waste water treatment.
Identifiers: *Thickeners, *Settling tanks, Solids flux, *Flux theory.

A survey is presented of the basic concepts involved in the design and operation of settlement tanks and thickeners; new theory on sedimentation or thickening is not included. Material normally found in research papers is presented in a way that the practicing designer or operator can grasp the concepts developed. The application of these concepts to the various features of tank design and operation is described. (Sandoski-FIRL)
W74-11261

AEROBIC TREATMENT OF FEEDLOT RUNOFF,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
Terence J. McGhee, R. L. Torrens, and R. J. Smaus.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1865-1873, Sept, 1973. 4 fig, 7 tab, 14 ref.

Descriptors: *Feed lots, *Agricultural runoff, *Aerobic treatment, *Waste water treatment, Cattle, Farm wastes, Physical properties, Chemical properties, Chemical oxygen demand, Biochemical oxygen demand, Liquid wastes, Sludge.

The feedlot runoff used in this study was obtained from the University of Nebraska. The units were operated at liquid retention times of 1-8 days. The study was conducted at room temperature. It was determined that an aerobic biological system can effectively treat settled feedlot runoff. Reductions of chemical oxygen demand of sixty percent may be obtained. Liquid retention times of three days or more are sufficient to insure satisfactory treatment. The color of the runoff is affected slightly by aerobic treatment. Analysis of chemical oxygen demand is superior to the 5-day biochemical oxygen demand determination in evaluating the efficiency of treatment and the strength of feedlot runoff. (Cartmell-East Central)
W74-11281

CHARACTERISTICS OF ZINC SMELTING INDUSTRIAL WASTE AND SIMULTANEOUS REMOVAL OF TOXIC ELEMENTS AND PHOSPHATES FROM IT,
Indian Defence Lab., Jodhpur.
L. M. Bhandari.
Indian Journal of Environmental Health, Vol 15, No 3, p 236-242, July, 1973. 4 tab, 5 ref.

Descriptors: *Zinc, *Industrial wastes, *Iron, *Effluents, *Waste water treatment, Toxicity, Mills, Hydrogen ion concentration, Chemical precipitation, Toxicity, Phosphates.
Identifiers: *India.

The chemical characteristics of the effluents from zinc smelter at Debari, Rajasthan, India are reported. The effluent was not only toxic due to the presence of metallic and flouride ions, but a high concentration of phosphates also rendered it unsuitable for disposal to the river water. Zinc and iron seem to be the major metallic ions in the waste; their concentrations varied between 120-160 and 35-48 mg/l, respectively. An attempt was made to remove zinc, iron, and phosphates by treating the effluent with sodium hydroxide or lime. The effect of increasing the pH of the effluent on percent removal of zinc and phosphates was studied. Lime seemed to be the most suitable precipitating agent for this effluent. (Jernigan-Vanderbilt)
W74-11354

ASPECTS OF AGRICULTURAL USE OF POTATO STARCH WASTEWATER,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
For primary bibliographic entry see Field 3F.
W74-11356

HEAVY METAL REMOVAL FROM WASTEWATER TREATMENT PLANT BY CHEMICAL TREATMENT,
C. M. West, W. P. Bonner, and R. B. Bustamante.
28th Annual Purdue Industrial Waste Conference, May 1-3, 1973, Lafayette, Indiana. 33 p, 10 tab, 18 ref.

Descriptors: *Heavy metals, *Wastewater treatment, *Treatment facilities, *Trace metals, Effluents, Tertiary treatment, On-site investigations, Toxicity, Chromium, Nickel, Cadmium, Copper, Lead, Mercury, Sampling, Testing procedures, Analytical techniques, Spectroscopy.

The sewage treatment plant in Cookeville, Tennessee was studied to determine the general quality of the effluent of the plant, with respect to heavy metals, and to determine the effect of the proposed tertiary treatment system on the quality of the effluent with respect to heavy metals. Six heavy metals were chosen for investigations, based on their toxicity and probability of occurrence in these effluents. The metals were chromium, nickel, cadmium, copper, lead, and mercury. Grab samples were taken from the sewage treatment plant effluent in August, 1971, when the flow was approximately 2.0 to 2.5 million gallons per day. Several of these samples showed small amounts of chromium and copper. An occasional sample indicated the presence of cadmium. None of the other heavy metals were detected. Tests were made on a fresh effluent sample taken in April, 1972 to determine: (1) treatment of the effluent with aluminum sulfates; (2) treatment of spiked effluent samples with alum; (3) treatment of spiked effluent samples with pH adjustment and alum; (4) the use of ferrous sulfate as a flocculant; and (5) the use of ferric chloride as a flocculating agent. It was concluded that the quality of the effluent, with respect to solids, could be improved by adjustment of pH and treatment with any one of the coagulants listed above. (Jernigan-Vanderbilt)
W74-11359

SOME EFFECTS OF METALS DISCHARGED IN EFFLUENTS AND POSSIBILITIES FOR THEIR RECOVERY,
Water Pollution Research Lab., Stevenage (England).
J. D. Swanwick, and J. V. O'Gorman.
Chemistry and Industry, p 573-575, June 16, 1973. 29 ref.

Descriptors: Effluents, *Sludge treatment, *Industrial wastes, *Wastewater treatment, Solvent extraction, Metallurgy, Separation techniques, Recycling, Public health, Ion exchange, Reverse osmosis.
Identifiers: Hydrometallurgical processes.

Removal of metals in sewage treatment leads to greatly increased concentrations in sludge. Agriculturalists have found that nickel, copper and zinc have the greatest adverse effects on crop growth. Increased uptake of metals by plants from soil treated with sewage sludge can also affect the health of humans. For these and economic reasons, it is wise to remove metals from sewage sludges, ideally to recover them. The most logical place for recovery is in the industry prior to discharge to the sewer. Thermal or hydrometallurgical processes may be used with the latter preferred for flexibility, rate of recovery, freedom from pollution, and low capital cost. Recovery from sludge may be accomplished by dissolving the waste in acid and applying an appropriate process such as solvent extraction (Cu, Ni, Co, B, etc), ion exchange (Cr, Cu, Zn, Cd, Hg) reverse osmosis (Ni), electrochemical methods, adsorption on activated carbon, or complex formation with polyelectrolytes. (Jernigan-Vanderbilt)
W74-11366

POLLUTION ABATEMENT IN A COPPER WIRE MILL.
Industrial Water Engineering, Vol 11, No 6, p 6, March/April, 1974. 1 tab.

Descriptors: *Copper, *Pollution abatement, *Industrial wastes, Effluents, Water pollution, Chemical precipitation, Metals, *Water reuse, *Recycling, *Waste water treatment, *Electrolysis.

The production of copper wire has always presented numerous pollution problems. The wire had to be 'pickled' and then coated and 'repickled' and rinsed. All of these techniques produced additional pollutants and the costs of treatment were excessive. In an EPA demonstration grant, the Volco Brass and Copper Company demonstrated that water consumption could be reduced by 90% from 200,000gal/d to 20,000gal/d by chemical reuse and water reuse. The sulfuric acid picke was regenerated and high purity metallic copper recovered by continuous electrolysis, thereby eliminating the dumping of spent pickel liquor. Hydrogen peroxide was proven to be an improved secondary pickle and the chromates and fluorides previously used were eliminated. Total solids leaving the plant in the rinse water were reduced from 2500gal/d to less than 100gal/d. Metal losses in the effluent were reduced to less than one pound per day compared to the previous 600-700lb/d. (Jernigan-Vanderbilt)
W74-11383

METHOD AND APPARATUS FOR SEPARATION OF SLUDGE,
FMC Corp., Santa Clara, Calif. (assignee).
F. F. Sako, and S. S. Chandler.
U.S. Patent No 3,833,204, 4 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 924, No 1, p 107, July 2, 1974.

Descriptors: *Patents, Liquid wastes, *Sewage treatment, *Activated sludge, *Aeration, Pollution abatement, *Wastewater treatment, Water pollution control, Water quality control, Electrodes, Separation techniques.

Liquid waste entering the activated sludge plant, after screening, comminuting, degritting and primary clarification, flows into an aeration basin. The mixed liquor discharged from the aeration zone is fed into a chamber for separation and densification of sewage sludge. This chamber is provided with electrodes. A difference of potential is imposed across the respective electrodes and current is passed in quantities to decompose water and produce fine bubbles of hydrogen and oxygen which rise in a dispersed form through the aqueous medium. As the sludge material is contacted by and has bubbles of gas adhered or occluded to it, a definite profile or lower limit of sludge blanket materializes. Effluent of acceptable quality can be discharged from any level intermediate the bottom of the sludge blanket being maintained by the rising bubbles and the electrodes. (Sinha-OEIS)
W74-11397

BIOTREATMENT PROCESS,
Sterling Drug, Inc., New York. (assignee).
A. H. Erickson, E. M. Pogainis, and G. H. Teletzke.
U.S. Patent No 3,824,186, 3 p, 1 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 631, July 16, 1974.

Descriptors: *Patents, *Wastewater treatment, *Aeration, *Biochemical oxygen demand, *Biological treatment, *Sewage treatment, Pollution abatement, Water pollution control, Water quality control, Dewatering, Organic wastes.

The method is achieved by feeding liquors to an aeration vessel containing a previously acclimated biological sludge, the loading rate of the liquors to the aeration vessel being between 1.0 and 5.0kg of biological oxygen demand per kg of mixed liquor volatile suspended solids. Then the mixture in the vessel is agitated for a period in excess of two hours with an oxygen containing gas while a dissolved oxygen content is maintained sufficient to support aerobic biological growth. The next step is to pass the mixture to a settling tank to separate accumulated biological sludge; recycle the settled biological sludge to the aeration tank; and remove from the aeration tank biological sludge at a rate approximately equivalent to the rate of accumulation of the biological sludge. (Sinha-OEIS)
W74-11398

AMMONIA ELIMINATION SYSTEM,
Environmental Protection Agency, Washington, D.C. (assignee).
D. H. Caldwell, and E. F. Barth.
U.S. Patent No 3,824,185, 4 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 631, July 16, 1974.

Descriptors: *Patents, *Wastewater treatment, Water pollution control, Water quality control, Nitrogen, Ammonia, *Nitrification, *Denitrification, *Biological treatment, Nitrobacter sp, Nitromonas sp.

Air stripping is combined with biological nitrification and denitrification. The procedure involves air stripping the main flow waste water stream. However, rather than discharge the ammonia laden air to the atmosphere, the air thereafter passes through an ammonia absorber where the ammonia content is absorbed into an aqueous side stream. The ammonia absorber constitutes also a biologic reactor in which nitrifying organisms, Nitrobacter species and Nitromonas species, present on adsorber surfaces and in the absorber water convert ammonia to nitrate and nitrite. The process serves to transfer the dilute ammonia nitrogen originally present in the waste water into a concentrated nitrate/nitrite absorber product stream, then to convert the nitrate/nitrite to nitrogen gas which can be safely discharged to the atmosphere. (Sinha-OEIS)
W74-11399

DEVICE AND APPARATUS FOR TREATING LIQUIDS SUCH AS DRINKING WATER AND WASTE WATER,
Societe Industrielle du Traitement des Liquides et des Gaz, La Courneuve (France).
P. Chapsal.
U.S. Patent No. 3,823,923, 4 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 569, July 16, 1974.

Descriptors: *Patents, *Waste water treatment, *Ozone, Pollution abatement, Water quality control, Bubbles, Potable water, Equipment, Water treatment.

The device comprises a tube which is immersed in liquid in a tank and communicates at its upper end with treating gas-supply means. A diffuser having radial vanes fixed to a rotating disc communicates with the lower end of the tube. A pump which is under and coaxial with the diffuser pumps the liquid from the tank through passages in the disc into chambers defined by the vanes so as to form in the chambers an emulsion of the gas and liquid which is thereafter ejected into the liquid in the tank. (Sinha-OEIS)
W74-11403

WATER TREATMENT FILTER BED FOR SEWAGE SYSTEMS,
J. L. Bergles, and M. A. Nelson.
U.S. Patent No 3,823,825, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 543, July 16, 1974.

Descriptors: *Patents, *Water treatment, *Filtration, *Sewage treatment, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, Tile drains, Treatment facilities, Equipment.

The trickle type water treatment filter bed has an absorption bed formed in the ground in which gravel is placed. A drain tile extends throughout the bed for conducting water from the sewage treatment plant and throughout the length of the bed. A drain wall is located in the ground and spaced a short distance from the absorption bed. The drain wall is formed at a depth lower than the depth of the absorption bed. It prevents surface and ground water from running into the absorption bed and thereby overloading the latter. It also functions to drain excessive sewer water from the absorption bed itself. (Sihna-OEIS)
W74-11405

PROCESS FOR TREATING WATER,
Economic Development Corp., Battleboro, Vt.
M. E. McLaughlin.
U.S. Patent No 3,823, 767, 10 p, 4 fig, 2 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 924, No 3, p 529, July 16, 1974.

Descriptors: *Patents, *Waste water treatment, *Dissolved oxygen, *Cooling water, *Thermal pollution, *Aeration, Pollution abatement, *Sewage treatment, Water pollution control, Reservoirs, Oxygenation, Powerplants.

The process includes storing water in a reservoir at a selected height above the level of the body of water, periodically releasing specified quantities of water from the reservoir at a point below the level and in an upward direction toward the surface and into the body of water. The upward direction of the released water is accomplished by releasing the water against a deflector located near the base of the reservoir. The released water forms a translatory wave in the body of water and as it moves away from the reservoir, it breaks causing effective mixing of air and water, cooling the water and increasing the oxygen content of the water. This action accomplishes excellent mixing of air and water and where solid particles are present, breaking and pulverizing of the particles. The invention pertains to cooling water effluent from power generating stations to prevent thermal pollution of natural bodies of water. In another embodiment it pertains to a more efficient method of aerating and treating sewage. (Sinha-OEIS)
W74-11406

POLLUTED WATER PURIFICATION,
Phillips Petroleum Co., Bartlesville, Okla.
E. O. Box, Jr., and J. Farha, Jr.
U.S. Patent No 3,823,088, 5 p, 6 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 342, July 9, 1974.

Descriptors: *Patents, *Water purification, *Catalysts, *Oxidation, Water pollution treatment, Pollution abatement, *Waste water treatment, Metals, Organic wastes.
Identifiers: Zinc aluminates.

Organically polluted waters are purified by contacting with a catalyst such as zinc aluminate and promoted with at least one metal active for initiating oxidative reactions in the liquid or gaseous phase under oxidizing conditions. Zinc aluminate can be prepared using any conventional method of preparation which will provide a solid material having a surface area of at least about one square meter per gram. One particularly suitable method is to intimately blend a mixture of aluminum oxide and zinc oxide, in essentially stoichiometric proportions, followed by a calcination step wherein the mixture is heated in air at temperatures of 1500-2200 deg F. Prior to the calcination, the mixture can be formed into conventional catalyst shapes such as pellets, extrudates, agglomerates, and the like. Some or all of the zinc aluminate can be in the spinel form. The process is particularly applicable for feeds in which the organic materials are hydrocarbons and/or oxygenated hydrocarbons. In vapor phase operation, the temperatures can be 600-1200 deg F., preferably 900-1000 deg F., and at any convenient pressure which will permit operation in the vapor phase. In liquid phase operation, the temperature within the reaction zone will generally be 350-550 deg F., preferably 400-500 deg F., and under a sufficient pressure to maintain a liquid phase within the reaction zone. (Sinha-OEIS)
W74-11407

ACID MINE WATER TREATMENT PROCESS,
Kettering Scientific Research, Inc., Yellow Springs, Ohio.
R. W. Treharne, and D. E. Wright.
U.S. Patent No 3,823,081, 3 p, 3 fig, 1 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 341, July 9, 1974.

Descriptors: *Patents, *Acid mine water, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, *Water purification, *Water treatment, Electrolysis, Potable water.
Identifiers: Iron hydroxide precipitate, Sulfuric acid.

A process for electrolytically converting acid mine water to potable drinking water having a neutral pH and a negligible iron content is claimed. The electrolytic cell treatment process has a cathode compartment wherein the pH of the acid mine water is driven basic and an iron hydroxide precipitate is formed. A sand barrier separates the cathode compartment from the anode compartment. In the anode compartment the pH is driven more acidic as sulfuric acid is concentrated. Electrolytic hydrogen evolved in the cathode compartment and electrolytic oxygen evolved in the anode compartment are possible by-products as are the sulfuric acid produced and iron from the iron precipitate produced. Alternatively, the evolved hydrogen and oxygen may be used within the electrolytic system to increase the efficiency. (Sinha-OEIS)
W74-11408

EWAGE FLOCCULATING AND SEDIMENTA-ION TANK UNIT,
ohnson Construction Co. A. B. Solna (Sweden).
. R. Dunkers, and J. H. Johansson.
.S. Patent No 3,822,788, 4 p, 2 fig, 15 ref; Offi-ial Gazette of the United States Patent Office, ol 924, No 2, p 268, July 9, 1974.

escriptors: *Patents, *Flocculation, Sedimentation, *Sewage treatment, Pollution atement, *Waste water treatment, Equipment, reatment facilities, *Settling basins.
lentifiers: Clarification.

rectangular tank consists of two sections, a floc-ulating section and a sedimentation section. Com-artments are formed in each of the sections to ubstantially and uniformly distribute the incom-g sewage and length of the tank. Outlets at the ottom of each of the flocculating sections open to the sedimentation section to guide the sewage om the flocculating section in a direction perpen-icular to the longitudinal axis of the tank and up-ard towards the outlet weir for discharge as arified water. The sewage is agitated in each of e flocculating compartments. The deposited udge is collected and transported by a suction evice. (Sinha-OEIS)
/74-11410

PPARATUS FOR TREATING AND PURIFY-NG SEWAGE, PARTICULARLY SEWAGE ONTAMINATED WITH DETERGENTS,
. Marschall.
.S. Patent No 3,822,786, 3 p, 1 fig, 12 ref; Offi-al Gazette of the United States Patent Office, ol 924, No 2, p 267, July 9, 1974.

escriptors: *Patents, *Ozone, *Detergents, Sewage treatment, Pollution abatement, *Waste ater treatment, Water pollution control, Sedi-entation, Flocculation, Water purification, Ac-vated carbon, Filters.

ewage purification apparatus includes an ozoniz-g container in which the sewage is recirculated nd purified by contact with ozone at substantially tmospheric pressure after passing through a eparator container where oil, grease, fat, and sol-ents are separated and a reaction container where irt and colloidal matter sedimented by a flocculat-g agent are removed. The purified water ithdrawn from the ozonizing container passes rough an activated carbon filter where residual zone in the water is converted into oxygen, and e gases in the upper portion of the ozonizing ontainer pass through an activated carbon filter here surplus ozone is converted to oxygen be-re the gases escape to the atmosphere. (Sinha-EIS)
/74-11411

EWAGE TREATMENT PLANT EQUIPPED /ITH AN AERATION IMPELLER,
R. Kaelin.
.S. Patent No 3,820,764, 3 p, 4 fig, 6 ref; Official azette of the United States Patent Office, Vol 23, No 5, p 1811, June 28, 1974.

escriptors: *Patents, *Sewage treatment, *Waste ater treatment, *Aeration, Pollution abatement, /ater pollution control, Water quality control, reatment facilities.

he sewage treatment plant comprises a basin and motor driven aerator. The aerator is supported at ast at three points. Two supports extend laterally om a platform with at least that portion of each upport adjacent to the platform being inclined ownward and outward at an angle of less than 45 egrees to the horizontal and to the surface of quid in the basin. The third support element con-itutes a bridge or walkway which connects the erator with the basin rim or edge. (Sinha-OEIS)
/74-11415

UNDERWATER SEWAGE COLLECTION SYSTEM FOR DOCKED BOATS,
H. E. Johnson.
U.S. Patent No 3,820,488, 7 p, 7 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 923, No 5, p 1737, June 28, 1974.

Descriptors: *Patents, *Waste water treatment, *Pollution abatement, *Water pollution control, Sewage disposal, Boats, Equipment.
Identifiers: *Sewage collection.

A system is designed to permit the sewage from a boat or ship to be conducted directly to a collection and storage area. The connection comprises a manifold defining a hollow chamber having two sets of inlets and outlets. A float valve associated with the second inlet permits water flow into the manifold but prevents escape of sewage. The sewage from the boat is flushed through the sewage outlet port into the manifold where such sewage is swept with the water into the conduit means for conduction to the sewage receiving and storage equipment. (Sinha-OEIS)
W74-11416

APPLICATION OF BIOLOGICAL FILTERS IN WATER TREATMENT SYSTEMS.
NASA Tech Brief, B73-10404, November, 1973.

Descriptors: Bacteria, *Filters, *Bactericides, Equipment, Water treatment, *Filtration, *Waste water treatment, *Biological treatment.
Identifiers: *Silver iodide.

Regular bacteria filters tend to accumulate bacteria and, when nutrients become available, the bacteria increase exponentially, which increases the possibilities of a breakthrough. Present effective lifetime of most filters is about 10 days. If a bactericide is used to kill bacteria near the filter, the lifetime of the filters can be extended. Silver chloride placed on or close to the barrier will kill the bacteria as they arrive. Dead bacteria accumulate linearly rather than increasing exponentially and hence filter life can be extended up to 30 days. (Shaffer-FIRL)
W74-11418

CONTROL OF SULFUR OXIDE POLLUTION FROM POWER PLANTS,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5G.
W74-11431

THE COANDA-EFFECT OIL-WATER SEPARATOR: A FEASIBILITY STUDY,
Naval Civil Engineering Lab., Port Hueneme, Calif.
D. Pal.
Available from NTIS, Springfield, Va., 22161 as AD-774 080, Price $3.25 printed copy; $2.25 microfiche. Technical Note 1331, February 1974. 35 p, 20 fig, 2 tab, 4 ref, 2 append.

Descriptors: *Oily water, *Waste water treatment, *Oil pollution, *Ships, *Separation techniques, Jets, Boundary processes, Boundaries(Surfaces).
Identifiers: *Coanda effect.

An experimental investigation which establishes the feasibility of using the Coanda effect in developing an oil-water separator is described. Tests conducted on an experimental model with an oil-water mixture containing 6% oil showed that the oil content in the effluent can be reduced to less than 3%. A three-stage separator produced effluent in the range of 1%. Conceptual designs of a practical separator are discussed. The space requirement for a Coanda-effect separator when compared with typical parallel-plate type separators of the same capacity is considerably smaller. Analytical expressions useful in designing a Coanda-effect separator of a given size are also given.
W74-11436

5E. Ultimate Disposal Of Wastes

DIGESTION BYPRODUCT MAY GIVE ANSWER TO ENERGY PROBLEM,
Knoerle, Bender, Stone and Associates, Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-10935

VACUUM FILTRATION OF SLUDGE,
Corsicana Water Utilities, Tex.
For primary bibliographic entry see Field 5D.
W74-11084

USE OF THE MULTIROLL PRESS FOR DE-WATERING CLARIFIER SLUDGE,
Waplans Mekaniska Verkstads A.B., Vaplan (Sweden).
For primary bibliographic entry see Field 5D.
W74-11096

OCEAN INCINERATION OF TOXIC WASTES.
Public Works, Vol 105, No 4, p 46-47, April, 1974.

Descriptors: *Hydrocarbons, Toxicity, *Incineration, *Oceans, Burning, Ships, Hydrochloric acid, Marine animals, *Waste treatment.
Identifiers: *Toxic wastes, *Ocean incineration, Combustion chambers, Vulcanus.

Chlorinated hydrocarbons and other toxic wastes may be destroyed by a new method, incineration at sea. A converted German cargo vessel was specially constructed so that its combustion chambers may take toxic wastes from British, Dutch, and Scandinavian companies. An American counterpart is proposed for 1975. The ship reduces the cost of incineration to nearly one half that of land incineration. Chlorinated hydrocarbon wastes are disposed of by incineration at 1400C. This temperature consumes 99 percent of the materials; fumes settle in the ocean and are converted into mild hydrochloric acid, which can be absorbed into the marine life without harm. Burning is done in combustion chambers in the rear of the ship and fumes fall astern into the wake. Burning in the North Sea is done fifty to sixty miles away from the nearest coastline, and clear of shipping lanes. Disposal is checked for conformance to government regulations after each trip. (Prague-FIRL)
W74-11132

THREE TONS IS ALL YOU GET.
Western Dairy Journal, Vol 29, No 8, p 12-13, June, 1973. 2 fig.

Descriptors: *Farm wastes, *Dairy industry, *Waste disposal, *Legal aspects, Cattle, Costs, Water Quality Control, Transportation, *California, Regulation.
Identifiers: *Manure.

A decision by California's Santa Ana Regional Water Quality Control Board states: The discharge of manure waste to lands owned or controlled by the discharger (dairyman) shall not exceed three tons (dry weight) per acre per year. The amount figures to the equivalent of 1.5 times the amount of manure produced by one cow in one year. The dairymen assume that if they can't put the manure on their own property, they must haul it away. But transportation and a place to haul it will be a problem. Also, the decision raises costs and could prevent dairymen from expanding herds to pay for those increases. The newest order requires a dairymen to report any increase in the number of animals by 25% or 100 head-whichever is smaller. (Cartmell-East Central)
W74-11237

SOIL COLUMNS FOR SIMULATING ANIMAL MANURE RECYCLING,
McGill Univ., Montreal (Quebec). Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-11242

MORE BEEF ON THE HOOF GOAL OF OHIO RESEARCH.
For primary bibliographic entry see Field 5D.
W74-11244

POULTRY ANAPHAGE IS HERE TO STAY,
Michigan State Univ., East Lansing. Coll. of Agriculture and Natural Resources.
For primary bibliographic entry see Field 5D.
W74-11246

5F. Water Treatment and Quality Alteration

INSPECTION OF NEW TREATMENT FACILITIES, THE ROCKVILLE WATER AND AQUEDUCT COMPANY,
Rockville Water and Aqueduct Co., Conn.
W. N. MacKenzie.
Journal of the New England Water Works Association, Vol 88, No 1, p 1-18, March, 1974.

Descriptors: *History, Organic wastes, Wastes, Water quality, Wastewater treatment, Potable water, Lakes, *Connecticut, *Treatment facilities, Water treatment, *Water pollution control.
Identifiers: Rockville(CT), Lake Snipsic.

The history of the Rockville Water and Aqueduct Company of Rockville, Connecticut is presented. A chronological summary of construction and events dating back almost 150 years is presented including a list of people important to the development of the company. The company was organized under a charter granted in April, 1893 as a result of the merger of the Rockville Water Power Company and Rockville Aqueduct Company. The company was concerned with controlled water pollution as early as 1907 when Lake Snipsic and its tributaries were examined for sources of pollution. The company acquired additional land for the sole purpose of protecting from pollution the drinking water supplied to the city. Anti-pollution rules were established in 1911 for those using the lake shore front. Organic wastes and refuse matter were forbidden to be deposited in the lake. (Merritt-FIRL)
W74-10909

DIRECT-FILTRATION STUDIES FOR METROPOLITAN TORONTO,
Proctor and Redfern, Toronto (Ontario).
For primary bibliographic entry see Field 5D.
W74-10928

ANDOVER GIVES SHOT TO SUPPLY,
Massachusetts Dept. of Public Works, Andover.
R. E. McQuade, and C. E. Fuller.
Water and Wastes Engineering, Vol 11, No 5, p 32-37, May, 1974. 11 fig.

Descriptors: *Water treatment, *Municipal water, *Treatment facilities, *Design criteria, *Costs, Filtration, Construction, Engineering, Water supply, *Massachusetts, Water supply, Potable water.
Identifiers: Public works, Andover(Mass).

Andover, Massachusetts recently completed construction of a new drinking water filtration plant with an ultimate capacity of 24 mgd. The plant currently draws water from Haggets Pond to supply the town's 24,000 residents and commercial and industrial users. In the future it is planned to augment this supply by drawing water from the Merrimack River. Included are the costs breakdown of building as well as basic design data, equipment used in the plant, and estimated operating costs for 1974. (Shaffer-FIRL)
W74-10944

APPLICATION OF MONITORING TECHNOLOGY (FOR ASSURING) DRINKING WATER QUALITY,
National Sanitation Foundation, Ann Arbor, Mich.
N. I. McClelland, J. R. Adams, R. R. Wood, and K. H. Mancy.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 54-55, 1974.

Descriptors: *Monitoring, *Water quality, *Automation, Data collections, Data processing, Municipal water, *Potable water.

Sensor systems were combined with newly developed automated electrochemical techniques in a mobile, computerized potable-water monitoring laboratory. Eighteen parameters are included in the system: temperature (thermistor); pH and alkalinity (glass electrodes); conductivity (a-c conductivity cell); turbidity (nephelometer); dissolved oxygen (voltammetric membrane electrode); chlorides, free and total fluorides, nitrates, and hardness (ion selective electrodes); free and total residual chlorine (galvanic cell); copper, cadmium, and lead (differential anodic stripping voltammetry); corrosion (polarization admittance technique); and deposition rate (calcium carbonate deposition test). (See also W74-10947)
W74-10960

AN AMPEROMETRIC MEMBRANE HALOGEN ANALYZER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W74-10980

TRACE ORGANIC CONTAMINANTS IN DRINKING WATER; EVALUATION OF SEMIPERMEABLE MEMBRANES AND OSMOTIC PUMPING TO ACHIEVE CONCENTRATION,
Gulf South Research Inst., New Orleans, La.
I. Cabasso, E. Klein, C. Eyer, and J. Smith.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 204-210, 4 tab, 7 ref.

Descriptors: Water analysis, *Membrane processes, *Potable water, Chemical analysis, Separation techniques, Analytical techniques, *Pollutant identification, Membranes, Reverse osmosis, *Organic compounds, *Water treatment, *Semipermeable membranes.
Identifiers: Trace organic compounds.

Concentration and retention for analysis of trace organic chemicals found in water were studied using membranes which are impermeable to organics and which are highly permeable to water. Three polymeric membranes were chosen for this study; two are asymmetric membranes of cellulose acetate and ethyl cellulose, and the third is a thin barrier coating polyethyleneimine condensate formed with toluene isocyanate in situ on a polysulfone porous support. The solute concentration in water was in the range of 100-1,000 ppm. Rejections were found to be significantly higher for the polyurea membrane than for the cellulosic derivatives. In general, rejection coefficients for ionizable species were much higher than those for the nonionizable ones. (See also W74-10947) (Knapp-USGS)
W74-10981

TRACE ORGANIC CONTAMINANTS IN DRINKING WATER; THEIR CONCENTRATION BY REVERSE OSMOSIS,
National Environmental Research Center, Cincinnati, Ohio.
M. Dienzer, R. Melton, D. Mitchell, F. Kopfler, and E. Coleman.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 211-217, 1974. 1 fig, 2 tab, 8 ref.

Descriptors: *Water analysis, *Membrane processes, *Potable water, Chemical analysis, Separation techniques, Analytical techniques, *Pollutant identification, Membranes, *Reverse osmosis, *Organic compounds, *Water treatment.
Identifiers: *Trace organic compounds.

A reverse osmosis method was developed for concentrating trace organic compounds in large volumes of water. Organic chemicals of sufficiently high molecular weights, arbitrarily defined as greater than 200, will diffuse very poorly through the membrane and will tend to be rejected, irrespective of their membrane solubilities. Compounds of low molecular weights with minimal spatial requirements but of poor membrane solubility will also be rejected. (See also W74-10947) (Knapp-USGS)
W74-10982

CATION-EXCHANGE REMOVAL OF COPPER FROM AMMONIACAL AQUEOUS SOLUTION,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
For primary bibliographic entry see Field 5D.
W74-11027

THE PERFORMANCE OF POWDERED ION-EXCHANGE RESINS,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
For primary bibliographic entry see Field 5D.
W74-11028

SPECIAL WATER FOR SPECIAL PAPER.
Rohm and Haas Reporter, Vol 32, No 1, p 15-17, Spring 1974. 4 illus.

Descriptors: *Industrial water, *Water treatment, *Boiler feed water, *Pulp and paper industry, *Water purification, *Water softening, *Ion exchange, Resins, Europe, Electric insulation, Water supply.
Identifiers: Amberlite ion-exchange resins, *Finland, Electrical papers, Capacitor paper, Dielectric papers.

Two Finnish paper mills use Amberlite ion-exchange resins for purification, especially deionization, of the process water supply needed in the manufacture of contaminant-free kraft pulps for use in electric insulation papers. Kemi Oy. in Karihaara near the Arctic Circle uses three separate water treatment lines, each comprising two large columns of mixed-bed ion-exchange resins. A similar installation is used for softening of boiler feed water supplied to the mill's power plant. In the vicinity of Helsinki in southern Finland, Tervakoski Oy. uses four trains, each comprising one cation-exchange, one weak and one strong anion-exchange, and one mixed-bed unit, to supply high-purity water needed in the manufacture of capacitor tissues and similar electrical papers. (Witt-IPC)
W74-11113

POLYELECTROLYTES AS PRIMARY COAGULANTS FOR POTABLE WATER SYSTEMS,
Topeka Water Dept. Kans.
C. N. Robinson, Jr.

urnal of the American Water Works Associa-
n, Vol 66, No 4, p 252-257, April, 1974. 6 fig, 6
.

escriptors: Model studies, *Clarification, Treat-
nt facilities, *Polyelectrolytes, Pilot plants,
boratory studies, Lime, Coagulants, Polymers,
lorine, Alum, Costs, Potable water, *Kansas,
ectrolytes, *Water treatment, *Wastewater
atment, Water purification.
ntifiers: Kansas River(KS).

ter observing conventional treatment processes
rough several seasonal changes in charac-
istics of the turbid Kansas River it was con-
ded that improvement in methods of clarifica-
n is warranted. Conventional purification in-
des chemical lime-soda ash process causing tur-
lity and subsequent chlorination, coagulation
th aluminum sulfate (alum), and coagulant aids
ch as activated silica. Disadvantages are found
each; suspended solids content in the Kansas
ver requires chemical treatments, each with ad-
ional problems. By pilot plant and laboratory in-
stigations over a two year period on the river,
lyelectrolytes were shown to be much more ef-
tive than the standard coagulants. Polymer
sins promote methods of separating the mud
n the chemical sludge. In addition, it is simpler
treat water of lower turbidity which has not ar-
cially hardened with chlorine and alum.
onomic advantages also result from this treat-
nt method. (Prague-FIRL)
74-11117

ARKETS FOR CHEMICALS GROW AND ROW,
eveland State Univ., Ohio.
r primary bibliographic entry see Field 5D.
74-11118

ASTIC VALVES STAND UP TO CHLORINE.
e American City, Vol 89, No 5, p 85-86, May,
74.

escriptors: *Plastics, *Water treatment, *Costs,
alves, Chlorine, Municipal water, Treatment
cilities, Filtration, Wastewater treatment,
hio.
ntifiers: *Ball valves, Plastic valves, Cleve-
d(OH), Full-flo ball valves, Sodium
drochlorite.

a municipal water treatment plant, plastic
lves have several advantages over metal ones.
ese include lower cost; they do not seize or gall;
y are unaffected by sodium hypochloride and
not corrode; and they do not experience storm
kage. At the Baldwin Treatment Plant in Cleve-
d, Ohio, thirty 1/4 inch and two 1 1/2 inch
stic ball valves have been used for two years
thout leakage or maintenance problems.
lypropylene and PVc Full-Flo ball valves were
lged best for their system. (Prague-FIRL)
74-11123

IE DIRECT REUSE OF RECLAIMED WASTE-ATER: PROS, CONS, AND ALTERNATIVES,
rollo (John) Engineers, Walnut Creek, Calif.
r primary bibliographic entry see Field 5D.
74-11153

GAE CONTROL IN WATER SUPPLY ESERVOIRS,
uthern Illinois Univ., Carbondale.
B. Muchmore.
ailable from the National Technical Informa-
n Service, Springfield, Va 22161 as PB-226 275.
nois Institute for Environmental Quality Report
IIEQ 73-9, July 1973. 34 p, 90 ref. 20.036.

escriptors: *Algal control, *Water supply,
eservoirs, Copper sulfate, Algicides, Illinois,
trients, Biological treatment, Intakes, Destratification, Aeration, Ultrasonics, Hardness(Water), Rotifers, Viruses, Chemcontrol, Application methods, Environmental effects, Bottom sediments.

Various methods of algal growth control (nutrient control, biological control, water intake location, destratification, light exclusion, ultrasonic radiation, and alternative algicides) were compared with the copper sulfate method. The most direct and environmentally desirable solution in water supply reservoirs is control of critical nutrients input. A literature search, questionnaires to each state agency responsible for water supplies, and contacts with individuals actively pursuing research in the area of algal growth control revealed that a generally applicable method more environmentally desirable than copper sulfate application has not been found. In evaluating copper levels that are safe for fish and other aquatic organisms, the extreme variability in toxic limits depend on the physical and chemical characteristics of the water. Copper is most toxic in soft waters. Hard waters, common in Illinois, cause rapid precipitation of the added copper as hydroxide and/or carbonate, thus greatly reducing toxic effects. The potential exists for ecological harm due to buildup of copper in bottom muds of reservoirs and streams fed by reservoirs that receive copper sulfate over extended periods of time. However, studies reported in the literature generally have failed to demonstrate that aquatic organisms have been affected by copper buildup in the sediment. (Auen-Wisconsin)
W74-11165

HYGIENIC EVALUATION OF A PORTABLE ION EXCHANGE FILTER FOR FIELD PURIFICATION OF DRINKING WATER, (IN RUSSIAN),
Kiev Research Inst. of General Communal Hygiene (USSR).
G. I. Panasenko, and N. I. Omel'Yanets.
Gig Sanit. Vol 37, No 7, p 108-109, 1972, Illus.

Descriptors: *Potable water, *Cytological studies, *Filters, Disinfection.
Identifiers: Carcinoma, Ion exchange filter, Hep-2 cells, KB cells.

A new PIF type portable ion exchange filter with ion exchange resin and biologically active fiber material reduced the coloration and the oxidizability of raw water by 2-3 X, and had no harmful effect on rats and on cell cultures (human epidermoid carcinoma (HEP-2) and human nasopharyngeal carcinoma (KB) cells). The ion exchange filter is suitable for the field purification of drinking water provided that additional disinfection is applied.--Copyright 1974, Biological Abstracts, Inc.
W74-11175

STATE OF TEETH IN CHILDREN IN THE FOCUS OF ENDEMIC FLUOROSIS, (IN RUSSIAN),
Central Research Inst. of Stomatology, Moscow (USSR).
A. I. Rybakov, and G. V. Baziyan.
Stomatologiya. Vol 51, No 1, p 42-48. 1972. Illus. English summary.

Descriptors: *Fluorides, Public health, Potable water.
Identifiers: Children, Fluorosis, Kolomna(USSR), Teeth.

Data from a mass stomatological examination of children born and living in the focus of endemic fluorosis of Kolomna, USSR and of those in a control district of the same town where there is an optimal fluoride content in the drinking water were compared. The intensification of the fluoride influence on the milk teeth with increase of its concentration in the drinking water and an absence of effect on permanent teeth were revealed. This was probably due to differences in the degree of maturity of enamel of milk and permanent teeth directly after their dentition. Studies were made of the spread of dental fluorosis of different degrees of severity in preschool children and schoolchildren and the incidence of disorders of separate teeth. A computer study of stomatological examinations of 1741 children (10-17 yr old) established a relationship between the spread of dental fluorosis, the time of birth and the injurious effect of fluoride during the first yr of life. The canine teeth and second molars were most often affected. Teeth on the mandible were less often affected by fluorosis.--Copyright 1974, Biological Abstracts, Inc.
W74-11180

HYGIENIC STANDARDIZATION OF THE PERMISSIBLE URANIUM CONTENT IN DRINKING WATER, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5A.
W74-11185

FIELD EXPERIENCE IN THE SANITARY-HYGIENIC CONTROL OF PIPE LINES IN THE WATER SUPPLY SYSTEM, (IN RUSSIAN),
Gorkovskii Meditskinskii Institut (USSR). Dept. of Hygiene.
V. L. Suslikov, and V. G. Georgiev.
Gig Sanit. Vol 37, No 9, p 89-90, 1972.

Descriptors: *Pipelines, Chlorination.

Improvement of sanitary control over the water distribution system, including strict control over accident-repair work on city mains by sampling and additional chlorination if necessary, reduced the number of spot checks which did not meet bacteriological standards.--Copyright 1974, Biological Abstracts, Inc.
W74-11186

INVESTIGATIONS ON THE VIABILITY OF TRICHOMONAS VAGINALIS IN TAP WATER AND PUBLIC SWIMMING POOLS, (IN RUSSIAN),
Bonn Univ. (West Germany). Institut fuer Medizinische Parasitologie.
For primary bibliographic entry see Field 5B.
W74-11193

FLOCCULATION OF AQUEOUS QUARTZ SUSPENSIONS WITH NEUTRAL AND CATIONIC POLYMERS IN THE PRESENCE OF CO(II), CA(II), OR FE(III),
Natal Univ. Pietermaritzburg (South Africa). Dept. of Science.
For primary bibliographic entry see Field 5D.
W74-11235

APPLICATION OF BIOLOGICAL FILTERS IN WATER TREATMENT SYSTEMS.
For primary bibliographic entry see Field 5D.
W74-11418

5G. Water Quality Control

THE DETERMINATION OF ZONES OF INTENSE CONTRIBUTION TO STREAM FLOW AS RELATED TO THE CONCEPT OF PARTIAL AREA CONTRIBUTIONS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-10904

INSPECTION OF NEW TREATMENT FACILITIES, THE ROCKVILLE WATER AND AQUEDUCT COMPANY,
Rockville Water and Aqueduct Co., Conn.

For primary bibliographic entry see Field 5F.
W74-10909

RIVER AVON COULD CONSIST LARGELY OF SEWAGE EFFLUENT.
Water and Wastes Treatment, Vol 17, No 1, p 13, January, 1974.

Descriptors: Water supply, *Water supply development, Water resources development, Rivers, Reservoirs, *Sewage, Effluents, *Water quality control, Groundwater resources.
Identifiers: *United Kingdom(River Avon), Bristol Avon River Authority(UK).

The report of the Bristol Avon River Authority warning that the River Avon could consist largely of sewage effluent is discussed. Water supplies are not limitless and the rising demand, which stems from increased per capita usage as well as population growth, could not only outstrip supply but also have a disastrous effect on the River Avon system. There are two solutions: water can be imported from other areas or local resources can be developed by river regulation and developing and optimizing groundwater resources. Future public water supply needs which by the year 2001 will exceed present resources by 66 million pgd can be met by constructing a new reservoir. (Merritt-FIRL)
W74-10911

THE PRINCIPLES OF SUBSTANTIATING PERMISSIBLE CONCENTRATIONS OF RADIOACTIVE SUBSTANCES IN FRESHWATER BODIES (PRINTSIPY OBOSNOVANIYA DOPUSTIMYKH KONTSENTRATSIY RADIOAKTIVNYKH VESHCHESTV V VODE PRESNOVODNYKH VODOYEMOV),
A. N. Marey, and R. M. Barkhudarov.
Gigiena i Sanitariya, No 1, p 50-54, 1974. 2 tab, 2 ref. English summary.

Descriptors: *Radioisotopes, Freshwater, Potable water, Food chains, Surface waters, Lethal limit, Path of pollutants, *Water quality standards, Legal aspects.
Identifiers: *Radiation doses, *USSR.

Permissible irradiation doses for man accepted by the national sanitary law were assumed as base in the standardization of radioactive isotopes in water bodies. The entry of radioactive isotopes into the body of a man with drinking water, their migration from the water body by the food chains, and the action of ionizing radiation from the surface of the water body and the flood lands were considered. (Merritt-FIRL)
W74-10912

STORM DRAINAGE SYSTEMS DESIGN MADE ADAPTABLE FOR COMPUTERS,
Austin Co., Roselle, N.J. Civil - Structural Dept.
For primary bibliographic entry see Field 4A.
W74-10916

A NEW NATURAL FACTOR IN THE SELF-PURIFICATION OF WATER BASINS (A VIZTAROLOK ONTISZTULASANAK UJ TERMESZETES TENYEZOJE),
For primary bibliographic entry see Field 5C.
W74-10922

PURE WATERS PROJECT INCLUDES RESTORATION,
For primary bibliographic entry see Field 5D.
W74-10926

ARTIFICIAL AQUIFER STOPS STORM POLLUTION.
For primary bibliographic entry see Field 5D.
W74-10929

A FIELD TRIAL OF ABATE LARVICIDE FOR THE CONTROL OF AEDES AEGYPTI IN BANGKOK, THAILAND,
World Health Organization, Bangkok (Thailand). Aedes Research Unit.
Y. H. Bang, and C. P. Pant.
Bull W H O. Vol 46, No 3, p 416-425, 1972.

Descriptors: *Aedes-aegypti, Breeding, Control, Fever, Larvicides(Abate), Mammals, *Thailand(Bangkok), Asia, Human diseases, Disease vectors.

In countries of southeast Asia, and particularly in Thailand, the practice of storing water for drinking and for household use in earthenware and cement jars in and around the house is widespread. These containers are the main breeding sites for Ae. aegypti, the vector of hemorrhagic fever in man. In the absence of a safe and effective vaccine against dengue hemorrhagic fever, vector control is the only way to prevent the spread of this disease at present. The low toxicity of Abate for mammals, combined with its long residual effectiveness against Aedes larvae at the low concentration of 1ppm and the fact that the active ingredient is released from the 1% sand granule formulation and retained by the walls of water containers, makes it feasible to use this formulation for long-term control of Ae. aegypti.--Copyright 1973, Biological Abstracts, Inc.
W74-10934

EFFECT OF WATER SALINITY ON THE INCIDENCE OF POSTHODIPLOSTOMUM INFECTION IN FISH, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
For primary bibliographic entry see Field 5C.
W74-10938

PROBLEMS ON POLLUTION AND WATER RESOURCES IN THE NEW YORK CITY METROPOLITAN AREA,
New York City Dept. of Water Resources.
For primary bibliographic entry see Field 5D.
W74-10942

WATER QUALITY MONITORING SYSTEMS FOR ENVIRONMENTAL WATER AND INDUSTRIAL EFFLUENT IN JAPAN,
Government Industrial Research Inst., Nagoya (Japan).
H. Sunahara, Y. Ishihara, T. Ishizuka, K. Nakajima, and K. Tanaka.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 56-60, 1974. 1 fig, 1 tab.

Descriptors: *Monitoring, *Water quality standards, *Automation, Water pollution, Industrial wastes, Sampling, Mercury, Phosphorus, Cadmium, Lead, Chromium, Arsenic compounds, Public health.
Identifiers: *Japan, Cyanide.

National Water Quality Criteria of Japan were established in April 1970. The criteria concerning human health were established for cyanide, alkyl mercury, organic phosphorous, cadmium, lead, chromate, arsenide, and total mercury. Aichi prefecture installed the first automatic monitoring system for river water quality. (See also W74-10947) (Knapp-USGS)
W74-10961

NPDES SELF-MONITORING AND REPORTING REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Permit Programs Div.
N. Lailas.
In: Preprints of Papers Presented at the 167th National Meeting of the American Chemical Society, April 1-5, 1974, Los Angeles, Calif: American Chemical Society, Division of Environmental Chemistry, Vol 14, No 1, p 108-110, 1974.

Descriptors: *Monitoring, *Water pollution sources, *Federal water pollution control act, *Regulation, *Water quality act, Water pollution control, Legislation, Law enforcement.

On October 18, 1972, the Federal Water Pollution Control Act Amendments of 1972 were enacted. One of the major features of this sweeping revision of the Federal Water Pollution Control Laws was the establishment of a new national permit system. This key water pollution control mechanism has the title of National Pollutant Discharge Elimination System (NPDES). This Act requires that industrial, municipal and other point source dischargers obtain permits for the discharge of any pollutants into the navigable waters of the United States. The permit that will be issued under the NPDES has a basic format of effluent limits, a compliance schedule, and monitoring requirements. (See also W74-10947) (Knapp-USGS)
W74-10970

A SYSTEMS APPROACH TO PROBLEM ORIENTED RESEARCH PLANNING: A CASE STUDY OF FOOD PRODUCTION WASTES,
International Research and Technology Corp., Arlington, Va.
T. B. Taylor, D. Coillett, R. McKenna, D. Overly, and S. Perelman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-228 114; $4.50 in paper copy, $2.25 in microfiche. Final Report, IRT-244-R, June 1973. 105 p, 32 fig, 5 tab, 7 ref.

Descriptors: *Research and development, *Planning, *Systems analysis, *Agriculture, *Wastes, *Pollution abatement, Water pollution, Air pollution, Land, Environmental sanitation.
Identifiers: *Technology assessment, Food production, Disaggregation.

Considered are two separate but interrelated topics: (1) the development and assessment of a systems approach to the identification of research needs; and (2) use of this approach in formulating a research program on problems dealing with wastes which result from U.S. food production. The method utilizes hierarchical formats for describing systems for providing goods or services and possible problems and problem solutions associated with the systems. System components, problems and possible corrective measures are progressively disaggregated and analyzed at greater levels of detail. Reported is the application of such a systems approach to the area of environmental pollution caused by release of wastes produced during the cultivation and processing of food plants, the raising of food animals, and the processing of food animal products. Problems and possible solutions requiring further research have been identified and rank ordered. The procedures developed and used in this study can provide a practicable, systematic framework for planning research programs related to areas of major national concern. (Bell-Cornell)
W74-11040

W.A.L.R.U.S. WATER AND LAND RESOURCE UTILIZATION SIMULATION PLAYER'S MANUAL (WISCONSIN VERSION),
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 6A.
W74-11041

FLOATING BOOM DEPLOYMENT APPARATUS,
Pacific Pollution Control, San Francisco, Calif. (assignee)

D. Tanksley.
S. Patent No. 3,807,617, 3 p, 3 fig, 2 ref; Official zette of the United States Patent Office, Vol , No 5, p 1923, April 30, 1974.

scriptors: *Patents, *Pollution abatement, *Oil lution, *Oil spills, Water quality control, Water lution control, Equipment, Separation hniques.
ntifiers: Deployment apparatus, *Booms.

e deployment apparatus is comprised of a reel storage, paying out and retrieval of the boom. lide is formed for support of the partition which ds the float. The slide is formed by a pair of s extending longitudinally in the direction of loyment of the partition and positioned in izontally spaced relation at a distance for eipt of the float between the rails. The rails are ported on vertical posts and have interconnect- cross members which define a channel for sage of the float between the rails. (Sinha-IS)
4-11046

E EFFECTS OF NITROGEN, POTASSIUM, D SUBIRRIGATION ON THE YIELD, ALITY, AND COMPOSITION OF SINGLE-USS TOMATOES,
ricultural Research Council, Littlehampton gland). Glasshouse Crops Research Inst.
primary bibliographic entry see Field 3F.
4-11048

OATABLE BOOM STRUCTURE,
ıera Projecting A. B., Nordmaling (Sweden). signee)
D. Oberg.
S. Patent No. 3,798,911, 6 p, 15 fig, 5 ref; Offi- Gazette of the United States Patent Office, 1 920, No 4, p 1087, March 26, 1974.

scriptors: *Patents, *Oil spills, *Oil pollution, llution abatement, *Water pollution control, ater quality control, Equipment, Barrier.

e boom consists of buoyant tubular body sec- ıs arranged in series along the length of the m. Each body section defining therein at least closed compartment, mechanical expansion ans within each compartment, and expansion ices. The boom becomes buoyant when eased from a flat storage state. The tubular ly sections when expanded are positioned so t they project upward above the surface to an ent sufficient to contain floating impurities. Air sages into each compartment prevent the entry water into these compartments. (Sinha-OEIS)
4-11054

L SLICK REMOVAL METHOD, SYSTEM D BAG THEREFOR,
L. Avey.
S. Patent No. 3,796,656, 4 p, 17 fig, 7 ref; Offi- Gazette of the United States Patent Office, 1 920, No 2, p 474, March 12, 1974.

scriptors: *Patents, *Oil spills, *Oil pollution, llution abatement, *Water pollution control, ater quality control, Separation techniques, uipment.

rge plastic bags, initially rolled on a drum, or erwise collapsed, are deployed horizontally so t the bags envelop a strip of oil slick on a body water. When each bag is fully deployed it is eased and the mouth, which is weighted, sinks he bottom of the body of water, or if the latter leep enough, the bag floats at the surface with weighted mouth hanging downward in the ter. The oil collects at the uppermost closed end the bag, where it can be removed either for se or disposal. (Sinha-OEIS)
4-11055

UNDERWATER LEAKAGE OIL COLLECTOR SYSTEM,
D. E. Rainey.
U.S. Patent No. 3,756,294, 3 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 914, No 1, p 124-25, September 4, 1973.

Descriptors: *Patents, *Oil pollution, *Pollution abatement, *Water quality control, *Water pollution control, Leakage, Equipment, Conduits.
Identifiers: *Pollution prevention, Underwater leakage.

To prevent leakage from an underwater break in an oil container by entrapping the escaping oil and conveying it to a new collector, an elongated, flexible and impervious conduit is attached to the source. The conduit has an inverted channel-shaped mouth composed of cushioned sealing material and flexible magnet for mating engagement with the leakage point. The bottom portion of the mouth remains open to permit entry of water into the conduit to float the entrapped oil and accelerate its passage upward through the conduit. (Sinha-OEIS)
W74-11056

APPARATUS FOR REMOVING A SUBSTANCE FLOATING AS A LAYER ON THE SURFACE OF A BODY OF LIQUID,
Bertin and Cie, Plasier (France); and Entreprise de Recherches et d'Activites Petrolieres, Paris (France). (assignees)
J-C. J. Mourlon, and E. M. R. Dubois.
U.S. Patent No, 3,800,951, 10 p, 37 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 173, April 2, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water quality control, *Water pollution control, Flotsam, Equipment, Separation techniques.

A screw impeller generates a whirlpool in the vicinity of the substance flotsam or oil. This causes a depression of downward tapering closed bottom cup-shaped outline. The unwanted substance which accumulates may thereafter be withdrawn. The operation of the equipment is as follows: A platform is brought to the area requiring treatment and is anchored. The motor is started up to turn the screw impeller. The light substance (oil) is centripetally drawn from the depression. A suction pump is started and is adjusted to a suitable flow-rate delivering the light substance to a collection tank. (Sinha-OEIS)
W74-11057

PROCESS FOR TREATING OIL SLICKS USING CHEMICAL AGENTS,
Chevron Research Co., San Francisco, Calif. (assignee)
R. L. Ferm.
U.S. Patent No. 3,810,835, 3 p, 3 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 922, No 2, p 593, May 14, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Water quality control.
Identifiers: *Chemical treatment, N,N-dialkyl amides, Glycols.

A chemical agent is applied to the vicinity of an oil spill in an effort to contain the spill. It is applied in such manner as to compress or gather the oil into a limited area. It is prefered to completely surround the slick with the chemical agent thereby compressing the oil spill into a limited area, preventing its spread. The chemical agent is selected from the group consisting of (1) N,N-dialkyl amides; (2) n-alkyl and n-alkylene monoethers of (a) ethylene glycol and (b) polyethylene glycol, (3) polyethylene glycol monoesters of n-alkyl acids; and (4) n-alkyl and n-alkylene monoesters of propylene glycol. (Sinha-OEIS)
W74-11059

FLOATING ANTIPOLLUTION BARRIER DEVICE.
Pneumatiques Caoutchouc Manufacture et Plastiques Kleber-Colombes (France).
L. Ballu.
U.S. Patent No. 3,811,285, 6 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 922, No 3, p 712, May 21, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, *Barriers, Separation techniques.

A floating barrier has a submerged skirt-like structure that is supported by floating devices. It comprises a longitudinal band of an air-tight pliable material folded in the longitudinal direction to provide two walls with the fold in the upward direction and an opening in the downward direction. Pockets are formed between the two walls and expanded when filled with air. The air is trapped when the barrier is placed in the water. (Sinha-OEIS)
W74-11060

APPARATUS FOR COLLECTING SURFACE PARTICLES ON BODY OF WATER,
L. Carter.
U S Patent No 3,811,325, 3 p, 4 fig, 5 ref; Official Gazette of the United State Patent Office, Vol 922, No 3, p 722, May 21, 1974.

Descriptors: *Patents, *Sampling, *Water quality, Pollutants, Ecology, *Flotsam, Equipment, *Pollution abatement.

The sampling device which is towed on the surface of the water is supported by two parallel, longitudinal floats. A rigid tubular framework with two horizontal hydrofoil bodies transverse to the floats is secured to the framework within the profile of the floats. The vertically stacked hydrofoil bodies define an intake opening, with the lower hydrofoil maintaining the intake opening at a predetermined depth below the water without causing disruptive turbulence, while the upper hydrofoil causes the sampling device to ride over swells and waves. The towing motion causes surface water to flow into the intake opening, where the flotsam is collected by a funnel-shaped net which has its wide end secured to the intake opening. The net, with the narrow end terminated by a collecting screen, lies partially submerged between the floats. (Sinha-OEIS)
W74-11061

OPERATOR CERTIFICATION PROGRAMS APPLICABLE TO INDUSTRIALLY OWNED WASTE WATER FACILITIES,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-11100

HISTORICAL DEVELOPMENT OF WATER POLLUTION CONTROL COST FUNCTIONS,
National Environmental Research Center, Washington, D.C.
D. P. Tihansky.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 813-833, May 1974. 31 fig, 2 tab, 151 ref.

Descriptors: *Reviews, *Bibliographies, *History, *Cost analysis, *Cost-benefit analysis, Mathematical studies, *Mathematical models, *Water quality control, *Water pollution control, Pollution abatement, Planning, Decision making, Social needs, Social aspects, Federal government, Legislation, Federal Water Pollution Control Act, Resource allocation, Research and Development, Costs, Cost-benefit theory, Comparative costs, Waste water treatment, Waste treatment.

Because functions depict the sensitivity of treatment costs to changes in the values of determinants, they are useful in selecting the least cost strategies of water quality control. The development of cost functions received its impetus from federal support in the mid-1960's. Major publications soon appeared, largely on municipal waste control, some on industrial waste control. Continuation of such studies was encouraged by recent amendments to the Federal Water Pollution Control Act. Although treatment cost estimates are important to decision makers, they do not reveal the complete framework of economic considerations. Costs should be compared to water use benefits if strategies are designed to improve social welfare. If maximization of social welfare is the goal, both cost and benefit functions will be valuable in water quality planning models. Research on benefit functions should progress rapidly, owing to congressional and other federal interest. Opportunity costs are also to be considered in optimized allocation of resources. Some of the most comprehensive and best known cost function reports are highlighted in this review; additional pertinent studies are also listed in the appended bibliography. (Brown-IPC)
W74-11102

MAKE WATER POLLUTION CONTROL A MEANINGFUL LOCAL RESPONSIBILITY,
Muncie Sanitary District, Ind., Water Quality Div.
For primary bibliographic entry see Field 5A.
W74-11120

URBANIZATION AND THE ENVIRONMENT--ENGINEERING IMPLICATIONS,
Johannesburg City Engineer's Dept. (South Africa).
For primary bibliographic entry see Field 4C.
W74-11124

MAJOR PORT DEVELOPMENTS AT RICHARDS BAY WITH DUE REGARD TO PRESERVING THE NATURAL ENVIRONMENT,
Council for Scientific and Industrial Research, Pretoria (South Africa).
For primary bibliographic entry see Field 2L.
W74-11125

SOME CURRENT PAPER INDUSTRY ENVIRONMENTAL PROTECTION PROBLEMS,
National Council of the Paper Industry for Air and Steam Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-11126

ADAPTIVE CONTROL APPLIED TO A WATER QUALITY SYSTEM,
Newark Coll. of Engineering, N.J.
H. J. Perlis.
Instrument Society of America Transactions, Vol 13, No 1, p 31-34, 1974. 1 fig, 3 tab, 13 ref.

Descriptors: *Model studies, *Control, *Water pollution, *Computers, Costs, Biochemical oxygen demand, Dissolved oxygen, Loading, Streams, Temperature, Mathematical studies, *Water quality control, Effluents.
Identifiers: Open-loop adaptive control.

A model system for a crude form of adaptive control has been applied to water pollution control problems. Its principle is response to changes in temperature, reacting with a computer. This is called open-loop adaptive control. A two-element control vector in a number of reaches of stream (not contiguous) is used. Cost/benefit tradeoffs are incorporated into the scheme. Results show a reduction in overall theoretical cost and an improvement in DO level maintenance and BOD loading. (Prague-FIRL)
W74-11129

OIL POLLUTION AND MARINE ECOLOGY,
University Coll. of Swansea (Wales). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-11166

PROTECTION OF THE ENVIRONMENT DURING DEMOLITION ACTIVITIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Weapons Effects Lab.
F. W. Skinner, L. Miller, and W. Harvey.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-772 920, Price $3.75 printed copy; $2.25 microfiche. Miscellaneous Paper N-73-6, December 1973. 57 p, 6 fig, 2 tab, 42 ref.

Descriptors: *Construction, *Explosives, *Pollution abatement, *Water pollution control, Explosions.
Identifiers: *Environmental protection, *Demolition.

New demolition techniques were developed to minimize hazards to the environment in areas with demolition activities. Basic guidelines and optional plans of action to be considered in planning demolition projects are discussed. Current Army policies concerning protection of the environment from demolition operations are in step with broad Federal policies aimed at improving the national level of environmental quality. Preliminary guidance, aimed at protecting or improving the ambient environment, is provided for elements of the Army undertaking on-base demolition projects. (Knapp-USGS)
W74-11208

ANALYSIS OF LIGHTWEIGHT OIL CONTAINMENT SYSTEM SEA TRIALS,
Hydronautics, Inc., Laurel, Md.
E. Miller, W. Lindenmuth, and R. Altmann.
Available from NTIS, Springfield, Va 22161 as AD-770 344, Price $4.00 printed copy; $2.25 microfiche. Coast Guard Interim Technical Report No CG-D-22-74, October 1973. 128 p, 49 fig, 7 tab, 5 ref.

Descriptors: *Oil spills, *Water pollution treatment, Oily water, *Separation techniques, Sea water, Equipment, Pollution abatement.

Full scale tests of a lightweight oil containment system were carried out in March 1972 off Point Conception, California, using refined soy bean oil. The oil loss was a strong function of towing speed and sea conditions. The major mechanism of oil loss was entrainment of droplets formed at the headwave and by motions of the air bags. (Knapp-USGS)
W74-11224

OIL-WATER REGENERATIVE SEPARATOR--FINAL REPORT OF PHASE I DEVELOPMENT PROGRAM OF A CONTINUOUS REGENERATING MOVING BED TO REMOVE OIL FROM OIL-WATER SUSPENSIONS,
Hydronautics, Inc., Laurel, Md.
For primary bibliographic entry see Field 5D.
W74-11225

INFORMATION ON THE RECENT PRACTICE OF HYGIENIC QUALIFICATIONS OF SURFACE WATERS, (TAJEKOZTATO A FELSZINI VIZEK HIGIENES MINOSITESENEK JELENLEGI GYAKORLATAROL),
K. Schiefner, I. Maar, and J. Rako.
Egeszsegtvdomany, Vol 18, No 1, p 58-63, 1974. 1 fig, 2 tab, 6 ref.

Descriptors: *Water quality standards, *Trophic level, *Algae, Oxygen demand, Coliforms, Sampling, Bioindicators.
Identifiers: USSR, *Trophic character.

Based on the results of chemical, bacteriologica and biological tests the extension is recommende of parameters for determining the hygienic quality of surface waters (as based on oxygen consump tion, coliform counts, and saprobic character) The adoption of 'trophic character' is advised which is evaluated by the number of algae found i a volume of water. 'Trophic character' determine on the basis of floral organisms has no direct rela tionship with the saprobiological feature whic determines the group classification for hygieni surface water utilization. The water qualificatio involving new parameters generally results in worse grouping of classifications. Evaluation o floral microorganisms (algae) draws attention t biological phenomena (mass production, flourish ing of water) that influence water consumptio primarily from the technological point of view and hint at their effects (mechanical, taste an odor effects). Statistical evaluations also confirm the necessity of adopting the new parameters i water qualification. (Shaffer-FIRL)
W74-11256

DETERMINATION OF THE HEMATOCRI VALUE OF CARP AND ITS INFLUENCIN WITH COBALT, (STANOVENI HE MATODRITOVE HODNOTY KAPRU A JE OVLIVNENI KOBALTEM),
Vyzkumny Ustav Rybarsky and Hydrobiologicky Vodnany (Czechoslovakia).
For primary bibliographic entry see Field 5C.
W74-11316

ICHTHYOTOXIC EFFECTS OF SOME ANTI POLLUTION PRODUCTS,
Laboratorio Provinciale di Igiene e Profilassi Genoa (Italy); and Genoa Univ. (Italy). Istituto d Farmacologia e Farmacognosia.
For primary bibliographic entry see Field 5C.
W74-11327

TOXICITY STUDY OF TWO OIL SPILL RE AGENTS TOWARD HUDSON RIVER FISH SPE CIES,
Marist Coll., Poughkeepsie, N.Y. Environmenta Science Program.
For primary bibliographic entry see Field 5C.
W74-11344

EFFECT OF OIL ON MARINE ECOSYSTEMS A REVIEW FOR ADMINISTRATORS AND POL ICY MAKERS,
National Oceanographic and Atmospheric Ad ministration, Juneau, Alaska.
D. R. Evans, and S. D. Rice.
Fishery bulletin, Vol 72, No 3, p 625-638, 1974. 7 ref.

Descriptors: *Publications, *Reviews, *Oil *Marine biology, Bibliographies, Documentation Oil spills, Ecosystems, Toxicity, Water pollutio sources, Water pollution effects, Organic com pounds, Environmental effects, Biodegradation Sediments, Food web, Laboratory tests, On-sit investigations.
Identifiers: *Crude oil, Long-term impacts Sublethal effects.

A broad selection of recent literature on the e fects of oil on marine ecosystems is reviewed. Th focus is on studies on crude oil, and the results a discussed with the purposes of providing a sum mary of findings that will be useful as a referenc for administrators and policy makers involved decisions concerning petroleum developments ar related activities. The characteristics of crude o and factors modifying its impact on the marine e vironment are discussed. Most research on t toxicity of oil has dealt with acute effects and da on long-term impacts at the community level a inconclusive. It is concluded that chronic low-lev pollution is potentially more damaging ecosystems than isolated catastrophic spills. De

sion makers are forced to rely on interpretive judgments rather than conclusive data. (Katz)
W74-11348

THE CONCENTRATION CONTROL OF SOLUBLE COPPER IN A MINE TAILINGS STREAM,
Montana Univ., Missoula. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-11361

PROPELLING ARRANGEMENT FOR OIL AND GARBAGE SKIMMER CRAFT,
A. Y. Derzhavets, P. G. Kogan, V. N. Semenov, and V. I. Tabachnikov.
U.S. Patent No 3,823,828, 4 p, 2 fig, 1 reg; Official Gazette of the United States Patent Office, Vol 924, No 3, p 544, July 16, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Skimming, *Pollution abatement, Water pollution control, Water quality control, Flotsam, Equipment.
Identifiers: *Skimmers.

A propelling arrangement divides the water flow entering a skimmer craft into two streams. One stream is a surface layer of water which contains floating impurities entering the collecting receptacle. The other is the underlying layer of water entering the duct for delivery to the water jet. There is thus a simultaneous drawing in of the surface layer of water together with floating impurities towards the intake of the collecting receptable. At the same time, the water flow running through the duct towards the water jet, due to the effect of the ejection passage draws water off the collecting receptacle to provide a difference in the level of water in the collection receptacle and that of the surrounding water, which is needed for the inflow to the collecting receptacle of the layer of water which contains floating impurities. (Sinha-OEIS)
W74-11404

OIL SKIMMER MODULE WITH FREE FLOATING WEIR TROUGH,
A. J. Crisafulli.
U.S. Patent No 3,822,789, 5 p, 9 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 924, No 2, p 268, July 9, 1974.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Pollution abatement, Water pollution control, Water quality control, Skimming, Equipment, Separation techniques, *Weirs.
Identifiers: *Skimmers.

The skimmer incorporates a sump box having a pump for conveying material from the sump box to the floating barge or vessel. A free floating weir is disposed forward of the sump box. The connection is such that the weir may rise in relation of the sump box which maintains its position in the water. Ball joint connections between the sump box and the weir guide the limited motion between them. The sump box is oriented so that at least a portion remains below the surface of the water. A gravity inlet receives a thin layer of water and the floating pollutants. (Sinha-OEIS)
W74-11409

METHOD FOR THE CONTROL OF OILS FLOATING ON WATER,
Tenneco Oil Co., Houston, Tex. (assignee)
R. E. Gilchrist, and J. C. Cox.
U.S. Patent No 3,821,109, 4 p, 7 ref; Official Gazette of the United States Patent Office, Vol 923, No 5, p 1891, June 28, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, Water quality control, *Separation techniques, Catalysts.
Identifiers: Liquid alcohols, Glycerids, Ketones, Ethers, Chemical treatment.

Oil spills are controlled by dispersing on the surface, a composition of matter comprising a drying oil and a carrier for the drying oil. The drying oil contains a major proportion of a component selected from the class consisting of unsaturated fatty acids, glycerids of unsaturated fatty acids and mixture thereof. It should contain from about 50 to 90 percent by weight of a carrier selected from the class consisting of liquid alcohols, ketones and ethers; and from about 1 to 10 percent by weight of a water insoluble metallic soap catalyst. (Sinha-OEIS)
W74-11413

LEGAL CONTROLS OF POLLUTION IN THE GREAT LAKES BASIN,
Ontario Water Resources Commission, Toronto.
H. Landis.
Canadian Bar Review, Vol 48, p 66-157, 1970.

Descriptors: *Legal review, *Legislation, *Groundwater, *Surface water, *Pollution, *Law enforcement, *Canada, Great Lakes region, Harbors, Canals, Fisheries, Agriculture, Indian reservations, Water resources, Municipal water, Planning, Pesticides, Public health, Air pollution, Mining, Migratory birds.

Legal control of pollution of groundwater and surface waters in the Canadian part of the Great Lakes Basin is discussed, and the constitutional basis of such controls is considered. Provincial rather than federal primacy is recommended. Provisions of several laws are reported, including those of the Ontario Water Resources Commission Act; the Municipal, Drainage, Public Parks, and Planning acts; the Public Health and Pesticides Acts; the Conservation Authorities Act; the Energy, Gasoline Handling, and Air Pollution Control Acts; the Mining Act; the Lakes and Rivers Improvement, Public Lands, and Provincial Parks Acts; the Migratory Birds Convention Act; and the Canadian Water Act. Judicial decisions concerned with federal harbors, and canals, inland fisheries, agriculture, and Indian lands are also reviewed. (Shaffer-FIRL)
W74-11417

CONTROL OF SULFUR OXIDE POLLUTION FROM POWER PLANTS,
National Environmental Research Center, Research Triangle Park, N.C.
F. T. Princiotta.
Available from NTIS, Springfield, Va., 22161 as PB-228 706, Price $5.75 printed copy; $2.25 microfiche. March 14, 1972. 51 p, 12 fig, 6 tab.

Descriptors: *Sulfur compounds, *Air pollution, *Powerplants, Sulfates, Acids.
Identifiers: Air pollution control.

A significant contribution of SO2 control within the next five years is possible using the wet lime/limestone scrubbing process, wet magnesium oxide scrubbing, and catalytic-oxidation. At least 20 full-size desulfurization control processes for powerplants are in the design, construction or operation phase in the United States at this time. Nineteen of these use one of the three processes listed above; 16 of these are wet lime/limestone systems. The magnesium oxide (MgO) scrubbing process is similar to wet lime/limestone processes, except that the magnesium sulfite and sulfate reaction products are regenerated, producing a concentrated stream of SO2 for H2SO4 production and regenerated MgO for reuse. Wet lime/limestone processes have the lowest capital cost, followed by MgO; the catalytic oxidation process is the most expensive. The control processes discussed offer an economic incentive for use over low-sulfur fuel for many power plants, although power plant location and the fossil fuel type used strongly affect any comparison. (Knapp-USGS)
W74-11431

THE COANDA-EFFECT OIL-WATER SEPARATOR: A FEASIBILITY STUDY,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 5D.
W74-11436

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

COMPUTER SIMULATION OF WASTE WATER TREATMENT BY CHEMICAL-PHYSICAL PROCESSES,
Envirotech Corp., Palo Alto, Calif. Municipal Equipment Div.
For primary bibliographic entry see Field 5D.
W74-11037

ASSESSMENT OF SELECTED RANN ENVIRONMENTAL MODELLING EFFORTS,
Washington Univ., Seattle.
B. W. Mar, and W. T. Newell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 217; $6.75 in paper copy, $2.25 in microfiche. Report No NSF/RA/E-73-004, June 1973. 64 p, 3 tab, 14 ref. NSF FI-36373.

Descriptors: *Mathematical models, *Assessments, *Environment, Data collections, Projects, Surveys, Costs, Systems analysis, *Model studies.
Identifiers: *Environmental modeling, *Interdisciplinary modeling, Experiments.

Reported are results of an experiment conducted to assess and document interdisciplinary environmental modelling activities. Groups of modellers visited each of 11 RANN projects to stimulate inter and intra project discussions of the process of modelling. Results indicate that the process is seldom recorded, and the technology of interdisciplinary modelling has not ben documented0 ffort fails to maximize use of past experiences, and three common issues are faced time and again: (1) how to define and bound the model; (2) how to direct the team to ad0ress the construction and validate the defined model; and (3) how to document and communicate the model or its results. The final step in the experiment was analysis and synthesis of the collected data. Data sets included: (1) response to survey of project modelling goals and concerns; (2) summary of project content and of on-site discussion of the project modelling process; and (3) reports generated by individual projects. The latter two items are summarized in an appendix. It is almost impossible to construct a model when some specific boundaries and structure are lacking. A major incentive for documentation of the process as well as the substance of the model is required. Needed is an accounting system which provides a measure of the real cost of model development and use. (Bell-Cornell)
W74-11038

SYSTEMS ANALYSIS OF A MULTI-STAGE TUBULAR MODULE REVERSE OSMOSIS PLANT FOR SEA WATER DESALINATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 3A.
W74-11039

A SYSTEMS APPROACH TO PROBLEM ORIENTED RESEARCH PLANNING: A CASE STUDY OF FOOD PRODUCTION WASTES,
International Research and Technology Corp., Arlington, Va.
For primary bibliographic entry see Field 5G.
W74-11040

W.A.L.R.U.S. WATER AND LAND RESOURCE UTILIZATION SIMULATION PLAYER'S MANUAL (WISCONSIN VERSION),
Wisconsin Univ., Madison.
C. Thurow, J. Steinhart, and T. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11951 $2.75 in paper copy, $2.25 in microfiche. University of Wisconsin, Sea Grant Advisory Report No. 3, May 1973. 3 fig, 3 tab, 19 p.

Descriptors: *Simulation analysis, *Resources, *Water utilization, *Land use, Environment, Constraints, Decision making, Governments, Regions, Industries, Water pollution, Effluents, Agriculture, Recreation, Legislation, Cities, Tax rates, Systems analysis, Sewers.
Identifiers: *Game theory, Goal establishment, Strategies, Environmental quality.

WALRUS is a game about the processes of establishing goals and strategies for implementing them in a heterogeneous environment. The environment is represented by the physical and social realities simulated in the game: a medium-size town, Walton, situated on a bay and surrounded by two predominately rural townships. The game is played in rounds which represent approximately a year's time. Players attempt to control, and possibly optimize, their own position and the status of the region with respect to any one or more of four basic elements: economic strength, political strength, personal status and prestige, and overall environmental quality of the water resources. The lack of consensus among possible goals, or the complexity of establishing a consensus, is probably one of the more realistic aspects of this simple form of simulation modeling. Players must deal with two major physical contraints; (1) natural limitations of available land and the inevitable trade-offs in land-use decisions; and (2) water pollution. The major complexity in the game's environment involves the interaction of teams and the governmental units. The game is controlled by 'man-made laws' and by 'natural laws.' The former exist for each of three political jurisdictions. The latter include land-use characteristics, water and sewer characteristics, and influents and votes. (Bell-Cornell)
W74-11041

THE INTEGRATION OF SYSTEM IDENTIFICATION AND SYSTEM OPTIMIZATION,
California Univ., Los Angeles.
Y. Y. Haimes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 828, $10.70 in paper copy, $2.25 in microfiche. Ph D Dissertation, 1970. 147 p, 12 fig, 44 ref, 5 append. OWRR A-033-CAL(1).

Descriptors: *Optimization, *Analytical techniques, *Model studies, *Equations, Systems analysis, Algorithms, Constraints, Digital computers, Conjunctive use, Groundwater, Surface waters.
Identifiers: Production plants, Problem-solving.

The coupling relationship between system identification and system optimization is analyzed. Four approaches for the solution of the joint problem are proposed, as applied to both static and dynamic system modeling. The Equivalence Theorem shows the equivalency between the bicriterion problem where two objective functions are minimized. The epsilon-constraint approach which views one of the objective functions as a constraint is introduced and proved. Decomposition multilevel optimization are discussed in the context of solving the integrated problem. The epsilon-constraint method is investigated in detail and shown to be feasible. Two example problems are introduced, formulated, and solved. The production plant problem, which is a nonlinear static identification and static optimization problem, is solved via decomposition and multilevel optimization techniques following the epsilon-constraint approach. A static identification and dynamic optimization problem is solved via quasilinearization. Numerical results for both problems using the IBM 360/91 digital computer are presented. Conclusions and recommendations for further study are included. (Bell-Cornell)
W74-11042

USERS GUIDE FOR A U.S. GEOLOGICAL SURVEY RAINFALL-RUNOFF MODEL,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2A.
W74-11234

6B. Evaluation Process

RATIONAL INSTITUTIONAL ARRANGEMENTS FOR WATER RESOURCES MANAGEMENT,
Iowa Univ., Iowa City.
For primary bibliographic entry see Field 6E.
W74-10901

PURE WATERS PROJECT INCLUDES RESTORATION,
For primary bibliographic entry see Field 5D.
W74-10926

W.A.L.R.U.S. WATER AND LAND RESOURCE UTILIZATION SIMULATION PLAYER'S MANUAL (WISCONSIN VERSION),
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 6A.
W74-11041

WATER-SUPPLY DEVELOPMENT AND MANAGEMENT ALTERNATIVES FOR CLINTON, EATON, AND INGHAM COUNTIES, MICHIGAN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11223

EFFECT OF OIL ON MARINE ECOSYSTEMS: A REVIEW FOR ADMINISTRATORS AND POLICY MAKERS,
National Oceanographic and Atmospheric Administration, Juneau, Alaska.
For primary bibliographic entry see Field 5G.
W74-11348

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

HISTORICAL DEVELOPMENT OF WATER POLLUTION CONTROL COST FUNCTIONS,
National Environmental Research Center, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-11102

USE OF OZONE AND OXYGEN IN ADVANCED WASTE WATER TREATMENT,
W. R. Grace and Co., Baltimore, Md. Pollution Control Systems.
For primary bibliographic entry see Field 5D.
W74-11103

COST ANALYSIS OF GROUNDWATER SUPPLIES IN THE NORTH ATLANTIC REGION,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4B.
W74-11426

6E. Water Law and Institutions

RATIONAL INSTITUTIONAL ARRANGEMENTS FOR WATER RESOURCES MANAGEMENT,
Iowa Univ., Iowa City.
N. W. Hines, and J. P. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 627, $5.00 in paper copy, $2.25 in microfiche. Iowa Water Resources Research Institute, Ames, Report ISWRRI-50, October 1, 1973. 142 p. OWRR A-033-IA(1).

Descriptors: *Institutions, *Local governments, *State governments, *Administration, *Management, *River Basin Commissions, *Comprehensive planning, *Interstate Commissions, *Optimal development plans, *Alternate planning, Institutional constraints, Organizations, Land management, Interstate compacts, Water districts, Land use, Administrative agencies, Governmental interrelations, Water law.

The types of state water management agencies at the state and local level and the functions of these agencies are examined. State agencies have dominated the planning and regulatory activities, whereas the local agencies, such as city and county governments and special-purpose districts, have controlled project construction and operation activities. The problems of water resource management at the local level are examined. River basin management is explored by studying the problems of existing river basin agencies which result from the lack of a comprehensive, coordinated national plan. The strengths and weaknesses of past attempts at comprehensive river basin management are evaluated. Factors influencing the operational efficiency of comprehensive management institutions on the physical dimension of the area are discussed, and the viability of an optimal hydrologic solution in light of existing social, economic and political realities is examined. Alternative state institutional arrangements discussed include the consolidation of existing state agencies into an 'environmental superdepartment,' the addition of a state coordination council to the existing arrangement, and the formation of a state department of natural resources with a division of water resource management. Emphasis is placed on the need for coordination of land-use management with water management in an institutional arrangement. Local reorganization alternatives include a freeze of existing arrangements, the dissolution of special districts and assumption of their powers by county governments, and the creation of comprehensive water districts throughout the state on a river basin basis. Interstate reorganization of River Basin Commissions and compacts is recommended to encourage state participation in interstate water management only after the state institutions are reformed to phase out local districts and create a system of state natural resource districts.
W74-10901

THE ASSESSMENT OF ENVIRONMENTAL IMPACT--WATER QUALITY AND QUALITY ASSURANCE CONSIDERATIONS,
Industrial Bio-Test Labs., Northbrook, Ill. Environmental Sciences Div.
For primary bibliographic entry see Field 5A.
W74-10952

NPDES SELF-MONITORING AND REPORTING REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Permit Programs Div.
For primary bibliographic entry see Field 5G.
W74-10970

MAKE WATER POLLUTION CONTROL A MEANINGFUL LOCAL RESPONSIBILITY,
Muncie Sanitary District, Ind., Water Quality Div.

or primary bibliographic entry see Field 5A.
74-11120

DICIAL REVIEW OF ADMINISTRATIVE ECISIONS UNDER THE NATIONAL EN-RONMENTAL POLICY ACT OF 1969,
C. Geer.
nd and Water Law Review, Vol 9, No 1, p 145-7, 1974. 143 ref.

escriptors: *Legislation, *Judicial decisions, ederal project policy, Environmental effects, deral jurisdiction, Administrative agencies.
entifiers: *National Environmental Policy Act EPA), *Environmental Impact Statements.

e National Environmental Policy Act of 1969 EPA) was a congressional attempt to force all deral agencies to take note of the surrounding vironment and to provide for its protection. The cent flood of NEPA cases coming before the deral courts arises from the willingness of these urts to grant standing to sue to private citizens d environmental protection organizations. The preme Court has held that in general the estion of standing depends upon whether the rson has shown a 'personal stake in the outcome the controversy'. The decisions of federal agen-s made under NEPA are generally reviewable the federal courts. Both the agency's decision to whether the requirements of NEPA apply to e proposed project, and an analysis of the sub-ntive environmental factors actually taken into count are reviewable by the courts. In examin-g an agency's determination of the applicability NEPA and an agency's investigation of en-ronmental effects, the courts have applied vari-s standards at juducial review. (Ritchie-Florida)
74-11141

HE ECONOMIC ZONE IN THE LAW OF THE A: SURVEY, ANALYSIS AND APPRAISAL F CURRENT TRENDS,
ode Island, Univ., Kingston. Law of the Sea st.
Johnston, and E. Gold.
ccasional Paper No 17, June 1973. 53 p, 4 tab, 49 f, append.

escriptors: *Law of the sea, *International law, ceans, Navigation, International waters, Trea-s.

n economic zone proposal establishes an exten-ve maritime zone beyond the twelve mile terri-rial limits within which a coastal state would ex-cise national jurisdiction, in the form of exclu-ve or preferential rights with sole or special sponsibility, for resources and related activities. ne concept evolved from the practice of Latin-merican states' extending their maritime ju-sdiction 200 miles from their coasts. The concept s been embraced by developing nations in both atin-America and Africa. The first two Law of e Sea Conferences have seen proposals for onomic zones ignored. A third Law of the Sea onference has been called, and it is predicted at this time the status quo will not be maintained. ne evolution of the economic zone concept and ree current proposals are discussed. The con-rees are analyzed to determine the diplomatic asibility of the economic zone proposal. It is ncluded that a trend toward the acceptance of onomic zones exists which will not be reversed the Third U.N. Conference on the Law of the a. (Craig-Florida)
74-11142

OORHEAD BAYOU WATERSHED, SUN-LOWER COUNTY, MISSISSIPPI (FINAL EN-IRONMENTAL IMPACT STATEMENT).
il Conservation Service, Jackson, Miss.
vailable from National Technical Information ervice as EIS-MS-73-0905-F. May 1973. 43 p, 1 b, 2 map.

Descriptors: *Channel improvement, *Watershed management, *Watershed Protection and Flood Prevention Act, Channel erosion, Flood protection, Sedimentation.
Identifiers: *Environmental Impact Statements, *National Environmental Policy Act, *Moorhead Bayou, Miss.

This watershed project located in Sunflower County, Mississippi, involves conservation land treatment supplemented by channelization of forty miles of existing multiple purpose waterways to enhance watershed protection, flood prevention and agricultural water management. The area is dependent upon farming and related industries but the land is underproductive due to poor drainage. Erosion, sediment production and flood water damages would be significantly reduced by the project. Row crop and pasturelands will be more efficiently utilized. Approximately 230 acres of woodland will be lost along the channel banks but the economy of the area would be strengthened by providing additional employment. The turbidity of water will temporarily increase due to sediment disturbance during construction. The suggested alternatives, no action, less intensive use of the land, and conservation land treatment alone, would not be as economically desirable. The project is compatible with current and projected uses of the watershed in the county. The land required for installation of the project, labor and materials will be irretrievably committed. Comments were received by local, state and federal agencies. (Dillingham-Florida)
W74-11143

ENVIRONMENTAL DEFENSE FUND V. FROEHLKE (RESTRAINING ORDER UNDER NEPA).
348 F. Supp. 338-367 (W.D. Mo. 1972). 29 p.

Descriptors: *Judicial decisions, *Missouri, Dams, Reservoir construction.
Identifiers: *National Environmental Policy Act (NEPA), *Environmental Impact Statements.

Plaintiff Environmental Defense Fund brought action for declaratory judgment and an injunction restraining defendant Army Corps of Engineers from completing construction on a reservoir project and dam until an environmental impact statement (EIS) was completed and filed. The District Court held that since there would be no environmental impact from the mere construction but only from the actual operation of the dam, an injunction against the continuing building should not issue. The Corps stated that the EIS would be forthcoming prior to any closing of the dam. The plaintiff's contention that the National Environmental Policy Act (NEPA) requirement for an EIS mandated total and complete work stoppage was rejected. The court instead held that although the defendants were not in complete compliance with the NEPA, nevertheless an injunction should not issue automatically without consideration of all circumstances. In this case the disadvantages of a complete work stoppage in terms of contracts and economic damages were to be considered. Since the EIS was to be available prior to the closure of the dam, and since great economic harm would necessarily result, the plea for injunction was refused. The court did, however, retain jurisdiction over the issue should plaintiffs require a prompt remedy for questioning the sufficiency of the EIS, once published. (Salley-Florida)
W74-11146

CLAIMS TO THE OCEAN,
H. Rotkirch.
Environment, Vol 16, No 5, p 34-41, June, 1974. 7 fig.

Descriptors: *Law of the sea, *International law, *Oceans, *United Nations, Treaties, Continental shelf.
Identifiers: Law of the Seas Conference.

The United Nations will convene the third Law of the Sea Conference in June of 1974 in Caracas, Venezuela. The outcome of this conference will affect various users of the sea and its resources. Some of the main problems which will be raised at the upcoming conference are analyzed. The chief difficulty facing the conference is the diversity of interest groups involved. This diversity of interests is complicated by the fact that a single state may simultaneously represent several interests. One of the most important questions to be resolved is the extent a coastal nation may extend its jurisdiction. Another important question concerns a nation's right to limit freedom of passage. Closely related to this question is the preservation of the marine environment. Possible solutions to these problems are presented. (Gragg-Florida)
W74-11147

GULF OIL CORP. V. STATE MINERAL BOARD, ET AL. (ACTION ON MINERAL AND WATER BOTTOM RIGHTS).
291 So.2d 807 (La. App. 1974).

Descriptors: *Louisiana, *Judicial decisions, *Navigable waters, Gulf of Mexico, Oil.

Plaintiff seeks a declaratory judgment to quiet title to ownership of water bottoms against claims by Louisiana's State Mineral Board. The Mineral Board asserts that title to the bottoms vested in the state since 1910 when a statute forbade sale of such lands. Thus, plaintiff's claim of title is fatally defective. The court held that any sale of water bottoms was a nullity, as contrary to state law. Title had thus never been transferred from the state. The fact that plaintiffs and their ancestors-in-title had paid taxes on the land for six years did not stop the state from asserting its claim of right. Since the bottoms constituted a part of water bottom of a navigable body of water, the Gulf of Mexico, the sale of that land was a nullity and any royalties accruing to the owner of the land belong to the state. The Board of Commissioners had no authority to convey state bottom land, and the chain of title was irremediably faulty based on that defect. The court found the issues here were nearly identical to an earlier case, Winkler v. State, and that the holding of that case was dispositive. In Winkler the state's ownership of water bottoms, regardless of title in private claimants, was inalienable. A similar holding applied in this case. (Salley-Florida)
W74-11148

WATERS AND WATERCOURSES---LIABILITY FOR DIKING FLOODWATERS: REJECTION OF THE 'COMMON ENEMY' DOCTRINE.
Wash. Law Rev. Vol 44, p 516-522 1969. 30 ref.

Descriptors: *Washington, *Dikes, *Diversion structures, Flood plains, Flood plain zoning, Flood routing.
Identifiers: *Common enemy rule.

Construction of dikes to retain floodwaters within the confines of a river channel is an interference with the natural flow of the stream, and liability will result for damages caused by this interference. Washington courts had for many years followed the 'common enemy' doctrine. The doctrine states that naturally occurring precipitation and runoff is an outlaw which anyone can protect against, even though injury may result to others. Flood waters were held to be surface waters, but they could not be diverted out of a defined flood channel without incurring liability for damages. Any building of a dike, or deepening of a channel, which makes previously innocuous floods become the agent of erosion or damages property may create liability. Properties receiving benefits from flood control projects should carry the burden of property losses incurred in achieving those benefits. The technical and financial capacities of flood control projects have greatly increased and are now able to bear the economic costs they impose on others.

Possible alternatives to flood control structures, such as flood plain zoning, have negated the desirability of flood control projects if they are economically unsound. (Sperling-Florida)
W74-11149

A BILL TO PROVIDE FOR A FEDERAL ECOLOGICAL PRESERVE.
House Bill 3177, 93rd Cong, 1st Sess, 1973. 8 p.

Descriptors: *Continental shelf, *Offshore platforms, Oil wastes, Oil industry.
Identifiers: Coastal zone management.

This bill seeks to preserve a portion of the Outer Continental Shelf in the Santa Barbara Channel by providing for a moratorium on drilling operations. The moratorium would last until the ability to control and prevent pollution by oil discharges is improved and would be accomplished by labeling this area an ecological preserve. Offshore oil and gas production poses a serious threat of pollution of coastal waters. Present drilling and production methods and unsightly drilling rigs constitute an environmental and navigational hazard. The need for energy resources must be weighed against the need to develop the environment. All previous rights in leases issued pursuant to the Outer Continental Shelf Lands Act will be terminated, and the United States is vested with all rights in such leases. The holder of these leases is expressly authorized to bring an action for just compensation. A special account in the Treasury is specified to pay for these Santa Barbara leases and also what monies will go into the account. The suspension of drilling will last a maximum of five years. With the Secretary of the Interior's permission, the period can be shortened if the criteria previously outlined are satisfied. (Sperling-Florida)
W74-11150

WEBSTER V. ASKEW (ACTION TO ABATE ARMY CORPS ORDER TO CEASE LAND DEVELOPMENT).
371 F. Supp. 733 (N.D. Fla. 1973). 4 p.

Descriptors: *Florida, *Judicial decisions, Land use, Rivers and Harbors Act.

Plaintiff, a land developer, brought suit against the State of Florida and the Army Corps of Engineers. Plaintiff sought injunctive, declaratory, and monetary relief from a cease and desist order which served as notice of possible criminal sanctions for violations of the Rivers and Harbors Act. The plaintiff contended that the order was a tortious interference with his right to the use of his land. Defendants moved to dismiss the complaint on the grounds that the cease and desist order merely served as notice of an ongoing investigation and did not represent a final action by any agency. Since plaintiff had failed to exhaust his administrative remedies, the 'case and controversy' requirement for standing to sue was absent. The court sustained the motion to dismiss, holding that the court would have been required to postulate what the outcome of plaintiff's case would have been if he had followed the usual procedures of appeals and hearings at the agency level. This guesswork precluded a concrete and ripe controversy. Until all available administrative remedies were exhausted, a court hearing would be premature. (Salley-Florida)
W74-11151

BONELLI CATTLE COMPANY V. STATE OF ARIZONA (ACTION BROUGHT BY RIPARIAN OWNER TO QUIET TITLE TO LAND WHICH WAS ONCE SUBMERGED UNDER COLORADO RIVER).
94 S. Ct. 517 (1973). 14 p.

Descriptors: *Accretion(Legal aspects), *Arizona, *Submerged Lands Act, *Riparian rights, Riparian land, Colorado River.

Petitioner Bonelli brought an action to quiet title for lands exposed when a federal project on the Colorado River caused a shift in the river's course. Appellant State of Arizona contends that title remains vested in the State under either the equal footing doctrine or the Submerged Lands Act. Lower Arizona State courts found for Bonelli, but the Arizona Supreme Court held that title vested in the State. Petitioner appealed to the U.S. Supreme Court which held that under the equal footing doctrine states hold title to submerged lands to serve public purpose of maintenance of navigability, that once the waters receded that public purpose ended, and title to the land vests in the riparian owner as the newly exposed land represents an accretion. In effect, the State holds a fee on submerged lands that is defeasible on the event of a shift in the river course. Granting to the states of title to submerged lands was not intended as a windfall to the states, but rather as an implementation of the state's interest in preserving the public's access to navigable waters. Once that purpose is ended by a change in the river's course the public interest ends, and the common law concept of accretion controls. Since accretions vest in the riparian owner, petitioner's plea for quiet title must be honored. (Salley-Florida)
W74-11152

A BILL TO AMEND THE WILD AND SCENIC RIVERS ACT OF 1968.
House Bill 4326, 93rd Cong, 1st Sess, 1973. 2 p.

Descriptors: *Wild rivers, *California.
Identifiers: *Wild and Scenic Rivers Act of 1968, *American River.

This bill, provides that the Wild and Scenic Rivers Act of 1968 be amended by designating a portion of the American River in California, for potential addition to the national wild and scenic rivers system. The proposed amendment calls for Section 5, subsection (a) of the Wild and Scenic Rivers Act to include the North Fork of the American River from Cedars to Auburn Reservoir. The act also authorizes a study to be conducted by the Secretary of the Interior in accordance with provisions of the Wild and Scenic Rivers Act. The bill also designates both the completion date of the study and submission date to the President and the Congress. (Proctor-Florida)
W74-11154

DAMAGES FROM POLLUTION OF AIR AND OF SURFACE AND SUBTERRANEAN WATERS,
J. B. Anderson.
Idaho Law Review, Vol 10, No 1, p 1-26, Fall 1973. 111 ref.

Descriptors: *Penalties(Legal), Judicial decisions.
Identifiers: Injunctions.

The measure of damages resulting from pollution of air and both surface and ground waters is discussed. The analysis is based on Idaho cases. It is first necessary to determine whether the injury complained of is permanent in the legal sense or merely temporary, or recurrent. A different measure of damages applies to each. The analysis can be divided into damage to real property, personal property and to crops, trees and shrubs. The Idaho cases involve apportionment of damages between independent tort-feasors. Although there is a dearth of pollution cases in Idaho, the measure of damages is substantially the same regardless of the cause of the interference with property. (Gragg-Florida)
W74-11158

THREE TONS IS ALL YOU GET.
For primary bibliographic entry see Field 5E.
W74-11237

LEGAL CONTROLS OF POLLUTION IN THE GREAT LAKES BASIN,
Ontario Water Resources Commission, Toronto.
For primary bibliographic entry see Field 5G.
W74-11417

6F. Nonstructural Alternatives

SPECIAL FLOOD HAZARD INFORMATION REPORT, OCHLOCKONEE RIVER, FLORIDA, LAKE TALQUIN TO ALLEN LANDING.
Army Engineer District, Mobile, Ala.
November, 1971. 7 p, 1 tab, 12 plate.

Descriptors: *Reservoir operation, *Flood control, *Florida, Multiple purpose reservoirs, Flood plains.

Ownership of Jackson Bluff Dam and reservoir, Lake Talquin, on the Ochlockonee River in Leon and Gadsden Counties, Florida, has been transferred by the Florida Power Company to the State of Florida. The Division of Recreation and Parks of the Florida Department of Natural Resources assumed operation of the facility on June 1, 1971. The Department of Natural Resources requested a report on the flood probability for Ochlockonee River for the purpose of providing information and guidance for developing the flood plain. Rainfall reports from the National Weather Service and basin and river stage reports from the Geological Survey gauge at Bloxham, Florida, are used by the River Forecast Center at Atlanta, Georgia, to prepare flood predictions. The flood season is generally in the winter and spring. The flood plain is wide and very flat. Major natural floods occurred in the spring of 1948 and early fall of 1969. A dam failure in early fall in 1957 created flood conditions. The facility will be maintained for recreational purposes, and in addition programs for flood plain management have been instituted. (Barnes-Florida)
W74-11155

FLOOD PLAIN INFORMATION, HOADLEY CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11427

FLOOD PLAIN INFORMATION, WHIPPLE CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11428

FLOOD PLAIN INFORMATION, CARLANNA CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11429

FLOOD PLAIN INFORMATION, KETCHIKAN CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
For primary bibliographic entry see Field 4A.
W74-11430

6G. Ecologic Impact Of Water Development

EVOLUTION OF MONITORING FOR EARTHWATCH,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5A.
W74-10948

SESSMENT OF SELECTED RANN EN-
RONMENTAL MODELLING EFFORTS,
ashington Univ., Seattle.
r primary bibliographic entry see Field 6A.
74-11038

BANIZATION AND THE ENVIRONMENT--
GINEERING IMPLICATIONS,
annesburg City Engineer's Dept. (South
rica).
r primary bibliographic entry see Field 4C.
74-11124

AJOR PORT DEVELOPMENTS AT
CHARDS BAY WITH DUE REGARD TO
ESERVING THE NATURAL ENVIRON-
ENT,
uncil for Scientific and Industrial Research,
toria (South Africa).
r primary bibliographic entry see Field 2L.
4-11125

FFSHORE AIRPORTS EASE ENVIRONMEN-
L PROBLEMS,
sons (Ralph M.) Co., Los Angeles, Calif.
. Lord.
rld Dredging and Marine Construction, Vol 10,
5, p 32-37, May, 1974. 5 fig.

scriptors: *Airports, *Facilities, *Construction
ts, *Construction materials, Engineering, En-
nmental effects, United States, Land reclama-
n, Costs.

e to increased awareness of the environmental
ation by the public, it has grown increasingly
ficult to undertake massive new airport con-
uction on land. As a result, a number of
shore airports have been proposed or are under
struction in the coastal areas of the United
tes. Some reasons that offshore airports
nimize environmental impact are: closeness to
jor metropolitan centers; buffering effect of the
ter barrier between the disagreeable features of
development and the general public; the
velopment is screened from view by the water
rier; there is a ready water supply for cooling
waste dispersion; and, in some cases
laimed land is actually cheaper than existing
shore land. Related types of developments that
y find it desirable to locate in an offshore
ting include power plants, deep draft ports,
vage treatment plants, desalination plants, ex-
ctive industries, meat packing plants, steel
ls, founderies and metal processing industries,
neries, solid waste disposal plants, and com-
nication systems industries. The basic methods
relamation are earth fill, poldering, pile support,
floating structures. A discussion of ongoing
jects and costs is included. (Shaffer-FIRL)
4-11127

LICY FOR LOCATION OF POWER PLANTS
COASTAL AREAS,
rth Carolina Univ., Raleigh, Sea Grant Pro-
m.
. Copeland, H. C. McKenzie, Jr., A.
mbusso, and L. E. Priester.
Report of the Governors' Conference on
rine Resources, p 43-52, December 17-18, 1973.

scriptors: *Heated water, *Water cooling,
oasts, *Offshore platforms, Cooling towers,
clear powerplants, Electric powerplants, Elec-
power production.

anel discussion on policy for location of power
nts in coastal areas was held in Charleston, S.C.
stimony was presented by experts representing
ee interests: the environmentalists', the utility
npany, and the U.S. Atomic Energy Commis-
n. Each member of the discussion recognized
need to increase production of electricity. The
el members recommended the following poli-
cies regarding location of power plants in coastal areas be implemented: identify and inventory the critical areas concerned; identify and obtain site approval for electrical power; and begin implementation of a public education program. Most power plants should not be sited in areas of critical environmental concern and must use modified intake and discharge structures to minimize entrainment. Power plants may be located offshore when the appropriate health and safety requirements are met. Differences in design and operation of power plants are necessary to insure that the specialized requirements of the marine and estuarine areas are satisfied. (Craig-Florida)
W74-11145

7. RESOURCES DATA

7A. Network Design

SYMPOSIUM ON ENVIRONMENTAL QUALITY MONITORING; SYMPOSIUM ON SOURCES AND EVOLUTION OF THE ATMOSPHERIC AEROSOL; GENERAL PAPERS.
For primary bibliographic entry see Field 5A.
W74-10947

EVOLUTION OF MONITORING FOR EARTHWATCH,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 5A.
W74-10948

OPTIMIZATION OF WATER QUALITY MONITORING PROGRAMMES,
Michigan Univ., Ann Arbor. School of Public Health.
For primary bibliographic entry see Field 5A.
W74-10949

VALIDATION OF ENVIRONMENTAL DATA BY INTERCALIBRATION AND LABORATORY QUALITY CONTROL PROGRAMS,
National Bureau of Standards, Washington D.C.
For primary bibliographic entry see Field 5A.
W74-10950

NEED FOR COLLABORATIVE STUDIES OF STANDARD METHODS,
National Environmental Research Center, Cincinnati, Ohio. Water Supply Research Lab.
For primary bibliographic entry see Field 5A.
W74-10951

A NATIONAL OVERVIEW OF EXISTING COASTAL WATER QUALITY MONITORING.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5A.
W74-11010

WATER DATA -- A NEW AWARENESS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 7C.
W74-11205

7B. Data Acquition

AN AMPEROMETRIC MEMBRANE HALOGEN ANALYZER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W74-10980

A SPECTROSCOPIC STUDY OF PASADENA SMOG,
National Environmental Research Center, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5A.
W74-10995

PHOTOCHEMICAL REACTIONS IN A DUAL OUTDOOR SMOG CHAMBER,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W74-10996

OPERATION CHARACTERISTICS OF NO2 PERMEATION DEVICES,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-11002

A PIEZOELECTRIC SENSOR FOR MERCURY IN AIR,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-11003

AN AUTOMATED INSTRUMENT FOR THE CONTINUOUS MEASUREMENT OF REACTIVE HYDROCARBONS,
Ontario Research Foundation, Sheridon Park.
For primary bibliographic entry see Field 5A.
W74-11007

INTERCOMPARISON OF SEVERAL TYPES OF CASCADE IMPACTORS,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11008

AN IMPROVED FIELD METHOD FOR DETERMINATION OF DISCONTINUOUS CAPILLARY MOISTURE (USOVERSHENSTVOVANNYY POLEVOY METOD OPREDELENIYA VLAZHNOSTI RAZRYVA KAPILLYARNOY SVYAZI),
For primary bibliographic entry see Field 2G.
W74-11014

METHOD OF INVESTIGATION OF NONLINEAR FILTRATION EFFECTS (O METODIKE ISSLEDOVANIYA NELINEYNYKH FIL'TRATSIONNYKH EFFEKTOV),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
N. F. Bondarenko, Ye. Z. Gak, G. P. Komarov, and Yu. A. Osipov.
Pochvovedeniye, No 8, p 139-143, August 1973. 3 fig, 16 ref.

Descriptors: *Analytical techniques, *Filtration, Properties, *Rheology, *Flow, Laminar flow, Turbulent flow, Viscosity, Velocity, Pressure, Stress, Porous media, Capillary action, Curves, Equations.
Identifiers: USSR.

Correct experimental conditions for investigations of nonlinear filtration effects and rheological properties of a fluid are described. Modeling of a real porous body by cylindrical capillaries of similar or varying cross-section and disregard for processes of relaxation of a fluid structure are incorrect whenever studies are made of the character of nonlinear filtration effects and of the rheology of a moving fluid. To successfully conduct investigations, stability of filtration flow through time should be rigorously maintained, and possible development of osmotic effects and boundary-layer movement should be controlled. A rheological curve of structured fluids and velocity variation during transition from laminar to turbulent flow are diagrammed. (Josefson-USGS)

W74-11016

CTD SENSORS, SPECIFIC CONDUCTANCE AND THE DETERMINATION OF SALINITY,
North Carolina State Univ., Raleigh. Inst. of Marine Sciences.
C. E. Knowles.
Available from NTIS, Springfield, Va. 22161 as COM-73-11690, Price $3.00 printed copy; $2.25 microfiche. Sea Grant Publication 73-16 (North Carolina Center for Marine and Coastal Studies Report No 73-3), August 1973. 14 p, 5 tab, 10 ref. NOAA Grants 2-35178 and 04-3-158-40.

Descriptors: *Salinity, *Sea water, *Electrical conductance, Water temperature, On-site tests, Data collections.
Identifiers: *Specific conductance.

To convert the specific conductance measured by a conductivity-temperature-depth sensor to salinity it is necessary to establish a means of estimating the specific conductance of seawater having a salinity of 3.5%. Third order polynomial expressions were formulated for one Red Sea Water and two Normal Water samples, each having a salinity of 3.5%. (Knapp-USGS)
W74-11033

THE USE OF STANDARD BODIES TO MEASURE THE CAVITATION STRENGTH OF WATER,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W74-11034

WATER QUALITY PARAMETER MEASUREMENT USING SPECTRAL SIGNATURES,
Texas A and M Univ., College Station. Remote Sensing Center.
For primary bibliographic entry see Field 5A.
W74-11230

QUALITY OF BERLIN SURFACE WATERS: MEASURING SCHEME, (DAS GUTEMESS PROGRAMM DER BERLINER OBERFLACHENGEWASSER),
For primary bibliographic entry see Field 5A.
W74-11252

HOW TO MEASURE AMBIENT POLLUTION,
Philips Gloeilampenfabrieken, Eindhoven (Netherlands).
For primary bibliographic entry see Field 5A.
W74-11255

A MODIFIED ION EXCHANGE TECHNIQUE FOR THE DETERMINATION OF STABILITY CONSTANTS OF METAL-SOIL ORGANIC MATTER COMPLEXES,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 5A.
W74-11262

A NEW MEIOFAUNA SAMPLER FOR QUANTITATIVE SAMPLING IN SOFT BOTTOMS, (EIN NEUER 'MEIOFAUNASTECHER' ZUR QUANTITATIVEN PROBENNAHME IN WEICHBODEN),
Kiel Univ. (West Germany). Zoologisches Institut.
R. Kolmel.
Marine Biology, Vol 25, No 2, p 163-168, 1974. 6 fig, 13 ref.

Descriptors: *Sediments, *Sampling, Technology, Bottom sampling, Assay, Benthos.
Identifiers: Meiofauna, Quantitative sampling.

A new method has been developed to obtain meiofauna samples from very soft and muddy sediments with high organic and water contents. The construction of the new instrument is described. It consists of a bottomless plexiglass box, the cover and front of which are easily removable. It does not cause compression of the sampled sediment, and hardly disturbs it. The semi-liquid surface of the sediment is kept in place by the use of a 'sledge' and a strip of tape inside the sampler. (Katz)
W74-11313

DESIGN AND EVALUATION OF A VIDICON SCANNING SPECTROMETER FOR MOLECULAR ABSORPTION AND ATOMIC EMISSION SPECTROMETRY,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11394

FILTER PORE-SIZE EFFECTS ON THE ANALYSIS OF AL, FE, MN, AND TI IN WATER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5A.
W74-11421

DETERMINATION OF TRACE METALS IN SODIUM DITHIONITE-CITRATE EXTRACTS OF SOILS AND SEDIMENTS BY ATOMIC ABSORPTION,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 5A.
W74-11425

EVALUATION OF GLACIER MASS BALANCE BY OBSERVING VARIATIONS IN TRANSIENT SNOWLINE POSITIONS,
Norwegian Water Resources and Electricity Board, Oslo.
For primary bibliographic entry see Field 2C.
W74-11437

7C. Evaluation, Processing and Publication

STORM DRAINAGE SYSTEMS DESIGN MADE ADAPTABLE FOR COMPUTERS,
Austin Co., Roselle, N.J. Civil - Structural Dept.
For primary bibliographic entry see Field 4A.
W74-10916

A SCHEME FOR ASSESSING THE RELIABILITY OF INTERPOLATED RAINFALL ESTIMATES,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W74-10941

THE ASSESSMENT OF ENVIRONMENTAL IMPACT--WATER QUALITY AND QUALITY ASSURANCE CONSIDERATIONS,
Industrial Bio-Test Labs., Northbrook, Ill. Environmental Sciences Div.
For primary bibliographic entry see Field 5A.
W74-10952

HYDROGEOLOGY OF THE USSR. VOLUME 15: BASHKIR ASSR (GIDROGEOLOGIYA SSSR. TOM XV. BASHKIRSKAYA ASSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11017

HYDROGEOLOGY OF THE USSR. VOLUME 29: KAMCHATKA, AND THE KURIL AND KOMANDORSKIYE ISLANDS (GIDROGEOLOGIYA SSSR. TOM XXIX. KAMCHATKA, KURIL'SKIYE I KOMANDORSKIYE OSTROVA).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11018

HYDROGEOLOGY OF THE USSR. VOLUME 38: TURKMEN SSR (GIDROGEOLOGIYA SSSR. TOM XXXVIII. TURKMENSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11019

HYDROGEOLOGY OF THE USSR. VOLUME 40: KIRGIZ SSR (GIDROGEOLOGIYA SSSR. TOM XL. KIRGIZSKAYA SSR).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoy Geologii, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-11020

NEW ANALYTICAL SOLUTIONS FOR DYNAMIC DIFFUSION EQUATIONS,
Princeton Univ., N.J. Water Resources Program.
For primary bibliographic entry see Field 2E.
W74-11021

GROUNDWATER BASIC DATA FOR ADAMS AND BOWMAN COUNTIES, NORTH DAKOTA,
Geological Survey, Bismarck, N. Dak.
For primary bibliographic entry see Field 2F.
W74-11024

WATER LEVELS IN ARTESIAN AND NONARTESIAN AQUIFERS OF FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4A.
W74-11025

DATA BANK INVENTORY: VOL. II--CHESAPEAKE BAY, EDITION 1, 1949 THROUGH 1970,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 2L.
W74-11026

HISTORICAL DEVELOPMENT OF WATER POLLUTION CONTROL COST FUNCTIONS,
National Environmental Research Center, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-11102

WATER DATA -- A NEW AWARENESS,
Geological Survey, Reston, Va.
W. W. Doyel.
Water Resources Bulletin, Vol 10, No 4, p 710-718, August 1974. 13 ref.

Descriptors: *Hydrologic data, *Data collections, *Data storage and retrieval, *Information exchange, *Data processing, Basic data collections, Computers, Data transmission, Networks, Automation, Water management(Applied).
Identifiers: *Water data.

One of the most significant changes in the field of hydrology in the past few years has been the increase in demand for basic data resulting from new awareness on the part of planners, developers

and managers of the essential nature of such data. For many years data collection has been an onerous, routine operation, following which the data were processed and stored - either in publications or file drawers - and the job considered completed. Two developments have changed that picture: the realization that we are drastically altering the environment, and the advent of the computer. The first forced a recognition of the need for accurate basic data and the second provided a new methodology for handling and using it. The change is evidenced in many ways and numerous activities are underway at both State and Federal level for all facets of the acquisition and handling of water data. The collection of basic data still involves hard routine work and a conscientious effort to maintain a high level of quality. Hopefully, recognition of the absolutely essential nature of an adequate data base will result in the continued enhancement of the basic-data collector and the concomitant increase in support of his activities. (Knapp-USGS)
W74-11205

CATALOG OF USSR GLACIERS. VOLUME 16. ANGARA-YENISEY REGION. NO. 1. YENISEY. PARTS 3-5. NO. 2. ANGARA. PART 1. (KATALOG LEDNIKOV SSSR. TOM 16. ANGARO-YENISEYSKIY RAYON. VYPUSK 1. YENISEY. CHASTI 3-5. VYPUSK 2. ANGARA. CHAST' 1),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-11213

CATALOG OF USSR GLACIERS. VOLUME 15. ALTAY AND WEST SIBERIA. NO. 1. GORNYY ALTAY AND UPPER IRTYSH. PART 6. CHUYA RIVER BASIN (KATALOG LEDNIKOV SSSR. TOM 15. ALTAY I ZAPADNAYA SIBIR'. VYPUSK 1. GORNYY ALTAY I VERKHNIY IRTYSH. CHAST' 6. BASSEYN R. CHUI),
Tomsk State Univ. (USSR).
For primary bibliographic entry see Field 2C.
W74-11214

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 3. AMU-DAR'YA. PART 6. SURKHOB RIVER BASIN BETWEEN MOUTHS OF THE OBIKHINGOU AND MUKSU RIVERS (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 3. AMU-DAR'YA. CHAST' 6. BASSEYN R. SURKHOB MEZHDU UST'YAMI REK OBIKHINGOU I MUKSU),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-11215

CATALOG OF USSR GLACIERS. VOLUME 8. NORTHERN CAUCASUS. PART 6. CHEGEM RIVER BASIN. PART 7. CHEREK RIVER BASIN(KATALOG LEDNIKOV SSSR. TOM 8. SEVERNYY KAVKAZ. CHAST' 6. BASSEYN R. CHEGEMA. CHAST' 7. BASSEYN R. CHEREKA),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-11216

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO 1. SYRDAR'YA. PART 4. (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 1. SYRDAR'YA. CHAST' 4.),
For primary bibliographic entry see Field 2C.
W74-11217

CATALOG OF USSR GLACIERS. VOLUME 17. LENA-INDIGIRKA REGION. NO. 2. MIDDLE LENA. PART 1; NO. 5. LOWER LENA. PART 2. (KATALOG LEDNIKOV SSSR. TOM 17. LENSKO-INDIGIRSKIY RAYON. VYPUSK 2. SREDNYAYA LENA. CHAST' 1; VYPUSK 5. NIZHNYAYA LENA. CHAST' 2.),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-11218

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 2. KIRGIZIA. PART 3. BASIN IN UPPER REACHES OF THE CHU RIVER (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 2. KIRGIZIYA. CHAST' 3. BASSEYN VERKHOV'YEV R. CHU),
For primary bibliographic entry see Field 2C.
W74-11219

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 1. SYRDAR'YA. PART 6. ATBASHI RIVER BASIN (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAYA AZIYA. VYPUSK 1. SYRDAR'YA. CHAST' 6. BASSEYN R. ATBASHI),
For primary bibliographic entry see Field 2C.
W74-11220

CATALOG OF USSR GLACIERS. VOLUME 14. SOVIET CENTRAL ASIA. NO. 2. KIRGIZIA. PART 2. BASINS OF LEFT-BANK TRIBUTARIES OF THE CHU RIVER DOWNSTREAM FROM MOUTH OF THE KOMORCHEK RIVER (KATALOG LEDNIKOV SSSR. TOM 14. SREDNYAVA AZIYA. VYPUSK 2. KIRGIZIYA. CHAST' 2. BASSEYNY LEVYKH PRITOKOV R. CHU NIZNE USTYA R. KOMORCHEK),
Leningrad State Pedagogical Inst. (USSR).
For primary bibliographic entry see Field 2C.
W74-11221

NORTH CASCADES HIGHWAY SR-20 AVALANCHE ATLAS,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2C.
W74-11226

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME I, REQUIREMENTS AND GENERAL PROCEDURES,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11231

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 10. PRINCIPLES OF GROUNDWATER HYDROLOGY,
Hydrologic Engineering Center, Davis, Calif.
For primary bibliographic entry see Field 8B.
W74-11232

USERS GUIDE FOR A U.S. GEOLOGICAL SURVEY RAINFALL-RUNOFF MODEL,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2A.
W74-11234

AUTOCORRELATION STRUCTURE OF MONTHLY STREAMFLOWS,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2E.
W74-11419

RIVER MILE INDEX, SEVIER LAKE BASIN, UTAH AND MINOR BASINS IN WESTERN UTAH AND EASTERN NEVADA.
Forest Service (USDA), Ogden, Utah. Intermountain Region.
Pacific Southwest Interagency Committee River Mile Index Report, June 1974. 41 p.

Descriptors: *Rivers, *Southwest US, Surveys, Maps, *Utah, *Nevada, River basins.
Identifiers: *River mile index, *Sevier Lake Basin(UT).

This river mile index for the Sevier Lake basin and minor streams in western Utah and eastern Nevada is one of a series of reports for stream basins in the Pacific Southwest. River mileages were determined from independent measurements made on U.S. Forest Service planimetric maps or U.S. Geological Survey topographical quadrangles. River mile distances were measured upstream from the mouth to the nearest tenth mile. Tributaries are shown as entering from the right or left from a position facing downstream. Streams and points of interest are based on the volume of flow, size of drainage, and degree of development. (Knapp-USGS)
W74-11432

DIGITAL MODELING OF RADIOACTIVE AND CHEMICAL WASTE TRANSPORT IN THE SNAKE RIVER PLAIN AQUIFER AT THE NATIONAL REACTOR TESTING STATION, IDAHO,
Geological Survey, Idaho Falls, Idaho.
For primary bibliographic entry see Field 5B.
W74-11439

HYDROLOGIC DATA FOR MOUNTAIN CREEK, TRINITY RIVER BASIN, TEXAS, 1972,
Geological Survey, Austin, Tex.
H. D. Buckner.
Open-file report, May 1974. 13 p, 1 fig.

Descriptors: *Basic data collections, *Rainfall-runoff relationships, *Small watersheds, *Texas, *Water yield, Data collections, Hydrologic data, Hydrographs, Discharge(Water).
Identifiers: Mountain Creek(TX), *Trinity River basin(TX).

Records of streamflow and reservoir content of Mountain Creek, Texas for the year are given in a form which facilitates their use in detailed analyses of the hydrologic system. This report covers the 1972 water year. The stream-gaging stations on Mountain Creek near Cedar Hill and Walnut Creek near Mansfield provide hydrologic data to define runoff characteristics from small drainage basins. They also serve as index stations for inflow into the reservoir and provide operational data for the reservoir. In addition, the station Walnut Creek near Mansfield is equipped with a recording rain gage. The stage station near Duncanville provides data pertinent to operation of the gates in the Mountain Creek Lake Dam. The reservoir-content station at the dam provides records of reservoir stage and contents. The stream-gaging station Mountain Creek at Grand Prairie provides records of outflow from Mountain Creek Lake and the basin. (Knapp-USGS
W74-11441

HYDROLOGIC DATA FOR PIN OAK CREEK, TRINITY RIVER BASIN TEXAS, 1972,
Geological Survey, Austin, Tex.
B. B. Hampton.
Open-file report, May 1974. 26 p, 2 fig, 3 tab.

Descriptors: *Basic data collections, *Rainfall-runoff relationships, *Small watersheds, *Texas, Data collections, Hydrologic data, Hydrographs, Sediment load, Discharge(Water), Water resources development.
Identifiers: Pin Oak Creek(TX), *Trinity River basin(TX).

This report, which is the thirteenth in a series of basic-data reports published annually for the Pin Oak Creek study area in Texas, contains the rainfall and runoff data collected during the 1972 water year for the 17.6-square-mile area above the stream-gaging station Pin Oak Creek near Hubbard, Texas. The locations of floodwater-retarding structures (ungaged) and hydrologic-instrument installations in the Pin Oak Creek study area are shown. The records collected before watershed development (1956-65) and after complete watershed development (1965-72) are to be used in the analyses of rainfall-runoff relationships. Four recording and two nonrecording rain gages are located in the study area to determine the amount and intensity of rainfall. The rain gages were located to give the best geometric coverage of the study area. Basin rainfall is computed as the arithmetic average of the six gages. Daily rainfall observed at the nonrecording gages is distributed to storm periods on the recorded rainfall. The stream-gaging station, Pin Oak Creek near Hubbard, continuously records the stage, which together with measurements of streamflow are used to compute runoff from the study area. (Knapp-USGS)
W74-11442

8. ENGINEERING WORKS

8A. Structures

SCALE-UP SOLID BOWL CENTRIFUGE PERFORMANCE,
Duke Univ., Durham, N.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10914

RECOMMENDATIONS FOR INSTALLING PVC GRAVITY SEWER PIPING,
Plastics Pipe Inst., New York.
R. Durazo.
Public Works, Vol 105, No 4, p 80-81, April, 1974. 2 fig.

Descriptors: Pipes, Engineering structures, *Sewers, *Plastic pipes, *Pipe foundations.
Identifiers: PVC pipes.

Procedures are described for installing PVC sewer pipe to get the best results. The pipe should be bedded true to line and grade with uniform and continuous support from a firm base. Blocking should not be used to bring the pipe to grade. Lateral restraint should be provided by properly placed and compacted backfill material. Appropriate material should be used for bedding, haunching, and initial backfilling. In addition, care should be taken during excavation to provide as narrow a trench as practical at a point level with the top of the pipe. Well points or underdrains may be required when excavating below ground water level. USCS Soil Classification System (FHA Bulletin No. 373) is described, and haunching and initial backfill procedures during various conditions and for the various soil classifications are described. (Murphy-FIRL)
W74-10919

EPOXY TAR LINES BIRMINGHAM'S TRUNK,
D. Hayward.
New Civil Engineer, p 40-41, January 31, 1974. 3 fig.

Descriptors: *Sewers, *Tunnels, *Linings, Engineering structures, Concrete pipes, *Epoxy resins, Protective coatings.
Identifiers: Epoxy tar, Glass fiber, *United Kingdom(Birmingham).

To deal with the problem of chemical attack and corrosion, Birmingham, England, is trying a new method of coating the inside of its sewer tunnel's smooth precast concrete lining with epoxy tar. The coating was developed by Spun Concrete and consists of fiber glass tissue sandwiched between two layers of epoxy tar. The fiber glass is for strength and abrasion resistance. A trowel is used to apply the coating. The 35 percent increase in cost will be offset by reduced maintenance and replacement. The tunnel is 1.5 meters in diameter and runs through rock riddled with coal seams, ironstone and fireclay. The coal seams had been worked and were open or filled with debris, presenting the danger of local subsidence. To accommodate this probable eventuality flexible pipes and linings were used (Flexilok - Extraflex segments made by Spun Concrete). The epoxy coating survived the construction process well. (Murphy-FIRL)
W74-10920

SEWER-WITHIN-SEWER SAVES CITY $400,000,
For primary bibliographic entry see Field 5D.
W74-10921

USE OF PIPELINES AS AEROBIC BIOLOGICAL REACTORS,
General Electric Co., Philadelphia, Pa.
For primary bibliographic entry see Field 5D.
W74-10925

THE PRESSURE SEWER: A NEW ALTERNATIVE TO THE GRAVITY SEWER,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 5D.
W74-10946

HYDRAULIC PERFORMANCE OF PENNSYLVANIA HIGHWAY DRAINAGE INLETS INSTALLED IN PAVED CHANNELS,
Lehigh Univ., Bethlehem, Pa. Dept. of Civil Engineering.
P. P. Yee, W. H. Graf, and A. W. Brune.
Available from NTIS, Springfield, Va 22161 as PB-222 488, Price $6.25 printed copy; $2.25 microfiche. Office of Research, Fritz Engineering Laboratory Interim Report 364-3, November 1972. 74 p, 23 fig, 8 tab, 11 ref, 2 append. Penn DOT 68-31.

Descriptors: *Intakes, *Drainage systems, *Road design, *Pennsylvania, Hydraulics, Hydraulic models, Design, Highways, Open channel flow, Runoff, Storm runoff.
Identifiers: *Drainage inlets.

The capacities of three different standard inlets gratings installed in paved channels by the Pennsylvania Department of Transportation were determined in a paved drainage channel equipped with adjustable slopes. The longitudinal slope ranged from 0.5% to 8%; one side slope ranged from 48:1 to 12:1; and the other slope was at an inclination of either 3:1 or 1/8:1. The drainage inlets studied were Type J Inlet, Type 4-Ft. Special Inlet, and Type 6-Ft. Special Inlet. Model inlets were built to half the scale of the actual inlets. Each inlet was tested under a variety of channel configurations and of channel flow rates. The capacity of an inlet was determined by actual measurements, and the efficiency of each inlet was obtained. A series of curves, relating efficiency to capacity for an inlet, are presented. The curves show that as more water flows in the channel toward an inlet the efficiency of the inlet decreased. (Knapp-USGS)
W74-11009

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA--VOL II, APPENDICES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 8B.
W74-11022

ENGINEERING ASPECTS OF WASTE WATER TREATMENT IN AERATED RING-SHAPED CHANNELS,
Technion - Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 5D.
W74-11065

SMOKE TESTING PINPOINTS SURFACE WATER INFLOW,
Superior Signal Co., Spotswood, N.J.
F. M. Nichols.
Deeds and Data (Water Pollution Control Federation), p D2, D6, June 1974.

Descriptors: *Treatment facilities, *Pipelines, *Engineering structures, *Surface waters, *Conduits, *Smoke, *Sewerage, *Hydraulic structures, *Aquifer testing, *Testing procedures, *Leakage, *Seepage control, *Infiltration, Rainfall, Operation and maintenance, Runoff, Subsurface runoff.
Identifiers: Smoke tests(For pipe openings), Defects.

Openings that allow surface water inflow are the principal cause of the overloading of waste water treatment plants and collection systems during a rainfall. Blowing a large volume of air mixed with smoke into the system is an economic and rapid way for locating such openings in sewage mains, laterals, and even house plumbing simultaneously regardless of pipe diameter. The cost of smoke testing is only a few cents per foot, including labor, equipment, and materials. Operating techniques of this method are outlined, and two illustrative case histories are cited. Smoke tests may reveal infiltration sources that are easily missed by other procedures, including camera surveys. They are also effective for acceptance inspection of new lines, if done within 72hr of backfilling before soil compaction. One or two sections of a main may be tested within 5-10min, much faster than other line testing methods. (Brown-IPC)
W74-11082

STEEL PIPELINE DESIGN,
Crest Engineering Co., Tulsa, Okla.
R. C. Hughes, W. R. DeKeyser, L. L. Elder, and G. R. Wilson.
Civil Engineering-American Society of Civil Engineers, Vol 44, No 3, p 64-67, March, 1974. 1 fig.

Descriptors: *Pipelines, *Design criteria, Standards, *Slurries, Temperature, Fluid temperature, *Corrosion control, Pressure, Structures, Engineering structures, Communication, Research.
Identifiers: *Steel pipelines, *Liquid petroleum, Water pipelines, Stress.

Design criteria differ for steel pipelines used for slurry, liquid petroleum, gas, and water. Experts in each area discuss differences between them. Slurry pipeline design refers to long distance transportation of a designed slurry; both liquid and solid stresses are discussed. Corrosion/erosion resistant linings are essential for reducing required wall thickness. For liquid petroleum pipelines, criteria for internal and external pressures defined in various codes and standards are the minimum requirements rather than the limits for the engineer. Factors to be considered in design are temperature, fluid temperature, dynamic effects, longitudinal stress, corrosion, threading and grooving, and wall thickness and defect tolerances. Gas pipelines follow similar criteria, with additional limitations due to possible internal corrosion. The discussion of water pipelines includes those buried for water supply and transmission pipelines with pipe in diameters 24 inches and larger. Internal pressures, external loads and protective lining and coatings, cathodic protection, and types of field joints are described. Standardized symbols in coding as well as communication between en

ineers in these subfields were deemed necessary.
Prague-FIRL)
/74-11119

FFSHORE AIRPORTS EASE ENVIRONMEN-AL PROBLEMS,
arsons (Ralph M.) Co., Los Angeles, Calif.
or primary bibliographic entry see Field 6G.
/74-11127

NERGY DISSIPATOR FOR SANTA PAULA REEK, SANTA CLARA RIVER, CALIFORNIA, YDRAULIC MODEL INVESTIGATION,
rmy Engineer Waterways Experiment Station, icksburg, Miss. Hydraulics Lab.
or primary bibliographic entry see Field 8B.
/74-11210

OCK AND DAM NO. 8, ARKANSAS RIVER AVIGATION PROJECT, HYDRAULIC IODEL INVESTIGATION,
rmy Engineer Waterways Experiment Station, icksburg, Miss. Hydraulics Lab.
or primary bibliographic entry see Field 8B.
/74-11211

N EMPIRICAL STUDY OF LIGHT PATH EHAVIOR, AND APPLICATION OF THE INDINGS TO THE DESIGN OF PRECISE SUR-EYING SYSTEMS FOR DAM ALIGNMENT.
owill, Inc., San Francisco, Calif.
vailable from the National Technical Informa-on Service, Springfield, Va 22161 as AD-773 654, rice $3.75 printed copy; $2.25 microfiche. Army ngineer Waterways Experiment Station, icksburg, Mississippi, Miscellaneous Paper 0-73-, December 1973. 55 p, 17 fig, append. Army ontract DACW03-71-C-0068.

escriptors: *Surveys, *Surveying instruments, Measurement, Light, Optical properties, Physics, ench marks, *Instrumentation, Refractivity.
lentifiers: *Lasers.

he forces and influences that act upon a precise rveying system were studied to attempt to entify the cause of detrimental influences and to vestigate the feasibility of minimizing these in-uences in practical applications. The effects of mperature, pressure, humidity, wind, and fog on ght paths were determined. The effects of eleva-on on survey lines, length of line, and laser out-it were also studied. In dam galleries, horizontal onuments in the form of stainless steel plates ould be grouted permanently into the gallery alls, to serve as precise survey positions, and as pports for instrument brackets, lateral ad-stors, and surveying instruments. Prior to and ring surveys, care should be taken to minimize e flow of air through the gallery from dif-rentially heated sources. To minimize the effect differential heating of the concrete, survey lines ould be at least 12 in. from the gallery walls. In ew dams, survey lines should be established mid-ay between gallery walls so that the effect of ydration heat will be equalized. During the sur-ey, personnel should stand at least 16 in. from the rvey line so that body heat does not create air mperature anomalies that may distort the survey ne. Survey lines should be located in regions of inimum air mixing. (Knapp-USGS)
/74-11212

B. Hydraulics

ETHOD OF TREATING SUBTERRANEAN ORMATION TO IMPROVE PERMEABILITY,
exaco, Inc., New York.
. B. Thigpen, Jr., and J. F. Tate.
.S. Patent 3,807,500. Issued April 30, 1974. Offi-al Gazette of the U.S. Patent Office, Vol 921, No p 1893-1894, April 30, 1974. 1 fig.

Descriptors: *Patents, *Aquifer management, *Permeability, *Subsurface drainage, *Artificial recharge, Infiltration, Clays.

A method is described for treating subterranean formations containing water sensitive clays which have sustained permeability damage due to contact with fresh water. To increase the permeability of the subterranean formations a solution of potassium chloride is injected into the formation via wells drilled into the formations. Treatment with a heated fluid including steam having a temperature of at least 300F for several hours follows. The formation is then further treated with mud acid or retarded mud acid. (Murphy-FIRL)
W74-10931

NIAGARA FALLS WATER PLANT CONVERTS GRAVITY FILTERS HYDRAULICALLY.
For primary bibliographic entry see Field 5D.
W74-10943

HYDRAULIC PERFORMANCE OF PENNSYLVANIA HIGHWAY DRAINAGE INLETS INSTALLED IN PAVED CHANNELS,
Lehigh Univ., Bethlehem, Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8A.
W74-11009

METHOD OF INVESTIGATION OF NONLINEAR FILTRATION EFFECTS (O METODIKE ISSLEDOVANIYA NELINEYNYKH FIL'TRATSIONNYKH EFFEKTOV),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 7B.
W74-11016

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA--VOL II, APPENDICES,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
E. R. Dodge.
Available from NTIS, Springfield, Va. 22161 as PB-220 094, Price $3.00 printed copy; $2.25 microfiche. Final Report to Montana Department of Highways Planning and Research Bureau, September 15, 1972. 141 p, 5 append.

Descriptors: *Design flow, *Culverts, *Montana, Regression analysis, Frequency analysis, Flood frequency, Peak discharge, Flood forecasting, Streamflow forecasting, Hydraulics.

A regional frequency analysis was performed, involving both natural and synthetic streamflow records, to estimate flood magnitude of various recurrence intervals for each of 230 Montana Watersheds. Using regression analysis, flood peak prediction equations for the 2, 5, 10, 25 and 50 year recurrence intervals were developed for each of 9 contiguous geographic regions in Montana. These equations predict the flood peak as the product of powers of various hydrologic watershed parameters. (Knapp-USGS)
W74-11022

LONG WAVE EXCITATION IN HARBOURS--AN ANALYTICAL STUDY,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
U. Unluata, and C. C. Mei.
Available from NTIS, Springfield, Va. 22161 as AD-770 842, Price $6.50 printed copy; $2.25 microfiche. Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Technical Report No 171, October 1973. 284p, 48 fig, 24 ref, 5 append. Navy Contract N00014-67-A-024-0036.

Descriptors: *Waves(Water), *Surges, *Seiches, *Harbors, Hydraulics, Wind tides, Mathematical studies, Winds, Resonance.

Harbor oscillations were studied analytically. Ignoring real fluid effects, the method of matched asymptotics was utilized by assuming that the large bodies of water in a harbor system communicate with each other through junctions of much smaller dimensions. In the neighborhood of a junction, the flow is approximated by a potential flow whereas in the greater part of the fluid, the junction can be represented by a source or a sink. The finite length of a short junction can be incorporated with the width to define an effective width, thereby enabling previous results for a gap in a thin breakwater to be extended. For a long and narrow bay the position of a partitioning breakwater with a gap is important for general modes. Improper positioning may adversely affect the inner bay. For a harbor with two coupled basins of equal size, the proliferation of resonant peaks is important. The effect of a river at the back of a harbor basin was also studied. Due to additional energy radiation, the response is in general less severe than the riverless harbor. (Knapp-USGS)
W74-11031

THE USE OF STANDARD BODIES TO MEASURE THE CAVITATION STRENGTH OF WATER,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
E. Silberman, F. R. Schiebe, and E. Mrosla.
Project Report No 141, September 1973. 49 p, 12 fig, 2 tab, 29 ref, 3 append. ONR Contract N00014-67-A-0113-0032.

Descriptors: *Cavitation, *Hydraulic models, Fluid mechanics, Bubbles, Laboratory tests.

A technique for measuring the cavitation strength of water is based on counting cavitation events as a function of cavitation number on a standard body, thereby producing cavitation characteristic curves. It is assumed that water cavitates because of nuclei carried in the water and that the measured characteristic curves must therefore be related to the nuclei which are present. It was hypothesized that the nuclei could be represented by a distribution of equivalent gas bubbles of neutral density. By calculating cavitation characteristic curves for various bubble numbers and size distributions and comparing the calculated curves with measured curves for the same body, it was possible to infer the specifications for the equivalent bubble nuclei that were present in any test. Incipient cavitation should be predictable. (Knapp-USGS)
W74-11034

THE RANDOM MODEL IN FLUVIAL GEOMORPHOLOGY,
Thomas J. Watson Research Center, Yorktown Heights, N.Y.
J. S. Smart.
Available from NTIS, Springfield, Va. 22161 as AD-768 040, Price $3.00 printed copy; $2.25 microfiche. Technical Report No 10, August 1973. 40 p, 7 fig, 1 tab, 33 ref. ONR Contract No N00014-70-C-0188.

Descriptors: *Geomorphology, *Statistical models, Hortons law, Stochastic processes, *Drainage patterns(Geologic), Erosion, Weathering, *Drainage density.

A statistical model of drainage basin composition is primarily based on two postulates suggested by investigations of the role of randomness in drainage network development. The postulates are: (1) the topology of channel networks is random; (2) link lengths are independent random variables drawn from a common distribution. Examples of the application of the random model in description, estimation, and explanation of drainage basin properties are given. (Knapp-USGS)
W74-11035

OFFSET BREAKWATER CONFIGURATION,
W. L. Moore.
U.S. Patent No 3,800,543, 4 p, 19 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 921, No 1, p 68, April 2, 1974.

Descriptors: *Patents, *Shore protection, *Breakwaters, Equipment, Beaches, Shores, Barriers.

A breakwater provides wave reflecting surfaces designed so that when part of the wave is reflected at one surface, another part is reflected at a surface which is displaced by approximately one-half the wavelength of the incident wave. The displacement of the reflecting surfaces serves to balance and cancel out wave forces on the structure itself and can be adjusted to correspond to the desired or expected range of incident wavelengths. (Sinha-OEIS)
W74-11058

ROUGHNESS COEFFICIENTS OF VEGETATED FLOOD PLAINS,
Ministry of Transport and Waterways, the Hague (Netherlands). Maas-River Study Div.
For primary bibliographic entry see Field 2E.
W74-11136

VARIED FLOW FUNCTIONS FOR ELLIPTIC CHANNELS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
O. Gueven.
Journal of Hydraulic Research. Vol 12, No 1, p 1-23, 1974. 5 fig, 8 tab, 6 ref, 1 append.

Descriptors: *Gradually varied flow, *Flow profiles, *Open channel flow, *Non-uniform flow, Flow, Channels, Hydraulics, Uniform flow, Equations, Dimensional analysis, Critical flow, Curves, Depth-area curves, Numerical analysis.
Identifiers: *Elliptic channels, Prismatic channels, Varied flow functions, Flow depth, *Nondimensional analysis, Channel geometry.

The equation of gradually varied flow is written in a suitable nondimensional form and two varied flow functions are defined. Numerical values for these functions are tabulated for elliptic channels with several different ratios of the semimajor axis to the semiminor axis. Dimensional and nondimensional flow profiles can be obtained with the aid of the two varied flow functions. Nondimensional curves are presented to aid in the calculation of uniform flow in elliptic channels. (Humphreys-ISWS)
W74-11139

CONCRETE ARMOR UNITS FOR PROTECTION AGAINST WAVE ATTACK, REPORT OF AD HOC COMMITTEE ON ARTIFICIAL ARMOR UNITS FOR COASTAL STRUCTURES.
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8F.
W74-11209

ENERGY DISSIPATOR FOR SANTA PAULA CREEK, SANTA CLARA RIVER, CALIFORNIA, HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. H. Ables, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-762 540, Price $3.00 printed copy; $2.25 microfiche. Technical Report H-73-11, June 1973. 52 p, 4 fig, 20 plate, 17 photo.

Descriptors: *Energy dissipation, *Hydraulic models, *Drops(Structures), Hydraulic structures, Hydraulic jump, Hydraulics, Spillways, Open channel flow, *California.
Identifiers: *Santa Clara River(CA).

The Santa Paula energy dissipator at the confluence of Santa Paula Creek and Santa Clara River, California, reduces velocities and dissipates energy from floodflows. Since floodflows could occur in the Santa Paula Channel with little or no tailwater effect from flow in the Santa Clara River, an energy dissipator that will function satisfactorily regardless of tailwater elevation is desirable. Thus, a design with impact blocks placed throughout the structure to gradually reduce velocities and induce backwater in the channel was used. A model investigation was conducted on a 1:20-scale model reproducing a 570-ft-long by 60-ft-wide high-velocity approach channel, a 750-ft-long energy dissipator, and a 500-ft-wide schematic portion of the Santa Clara River. Tests were concerned with flow conditions in the superelevated approach immediately upstream from the energy dissipator, the optimum size and configuration of the dissipator, and stability of the riprap plan at the confluence of Santa Paula Creek and Santa Clara River. Tests revealed that flow conditions in the high-velocity channel and curve immediately upstream of the energy dissipator were satisfactory, while conditions in the original design energy dissipator were unsatisfactory. An energy dissipator was developed and resulted in satisfactory flow conditions with design discharge conditions (27,000 cfs) as well as a full range of flows. (Knapp-USGS)
W74-11210

LOCK AND DAM NO. 8, ARKANSAS RIVER NAVIGATION PROJECT, HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. J. Franco, and C. D. McKellar, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-763 174, Price $3.00 printed copy; $2.25 microfiche. Technical Report H-73-10, May 1973. 91 p, 4 fig, 42 plate, 2 tab.

Descriptors: *Hydraulic models, *Arkansas, *Dams, *Canals, *Locks, Dredging, Sedimentation, Navigation, Channel improvement, River training.
Identifiers: *Arkansas River.

A movable-bed model reproducing 11.0 miles of the Arkansas River, with a horizontal scale of 1:120 and a vertical scale of 1:80, was used to determine the suitability of a proposed site for a lock and dam structure, adequacy of proposed regulating works in the reach upstream and downstream of the structures and modifications required to provide adequate channel dimensions and satisfactory navigation conditions, and relative effectiveness of various sizes of dredged channels. Development of an adequate channel in the reach was affected by the natural tendency for the channel to cross toward the right bank upstream of the proposed damsite and by the tendency for the channel to meander in the long flat bend downstream of the dam. Because of these tendencies, considerable modification of the proposed training structures to provide a reasonably stable channel of adequate dimensions would be required. (Knapp-USGS)
W74-11211

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME I, REQUIREMENTS AND GENERAL PROCEDURES,
Hydrologic Engineering Center, Davis, Calif.
L. R. Beard, A. J. Fredrich, and E. F. Hawkins.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-758 904, $6.00 in paper copy, $2.25 in microfiche. Report HEC-IHD-100, October 1971. 578 p, 31 ref.

Descriptors: *Hydrology, *International Hydrological Decade, *Computer programs, *Flood protection, Flood control, Reservoirs, Water supply, Hydroelectric power, Wate resources development, Hydrograph analysis, Systems analysis.
Identifiers: *Hydrologic engineering.

Hydrologic engineering methods are presented fo use in regions of sparse data. Procedures an methods are described that have been used suc cessfully in Corps of Engineers studies or are be lieved to be of significant interest. Description are presented of computer programs and man recently developed techniques for use in hydrolo ic studies. The types of water resources discusse include local flood protection, flood control b reservoirs, water supply by reservoirs, hydroele tric power developments, multipurpose reservoir and water resources systems. Three generalize computer programs covering different phases o hydrologic engineering are included. The first pr gram (HEC-1, Flood Hydrograph Package) cove most types of problems generally associated wit flood hydrograph analysis. HEC-2, Water-Surfac Profiles, is primarily concerned with investig tions related to river hydraulics problems. Th third program, HEC-3, Reservoir System Analy sis, deals with problems related to the planning design, and operation of a system of reservoirs fo conservation purposes. (See also W74-1123 (Knapp-USGS)
W74-11231

HYDROLOGIC ENGINEERING METHOD FOR WATER RESOURCES DEVELOPMENT VOLUME 10. PRINCIPLES OF GROUND WATER HYDROLOGY,
Hydrologic Engineering Center, Davis, Calif.
R. L. Cooley, J. F. Harsh, and D. C. Lewis.
Available from NTIS, Springfield, Va 22161 a AD-758 906, Price $6.00 printed copy; $2.2 microfiche. Report HEC-IHD-1000, Vol 10, Apr 1972. 342 p, 56 fig, 6 tab, 6 ref.

Descriptors: *Hydrogeology, *Groundwate movement, Water resources development, Finit element analysis, Computer programs, Porou media, Surface-groundwater relationships.

The fundamental concepts which govern the oc currence and movement of groundwater an described and the basic principles of hydrology geology, hydraulics, and physics as they relate t groundwater are explained. The information is su ficient to guide hydrologic engineers in th identification and initial considerations of ground water aspects of water resource development stu dies. A generalized computer program description 'Finite Element Solution of Steady-State Potenti Flow Problems,' is included. This program is in tended for application to problems involvin steady two-dimensional flow through heterogene ous, anisotropic porous media of any internal o external geometry. (See also W74-11231) (Knapp USGS)
W74-11232

MARINA PROTECTIVE WAVE BREAKER,
L. C. Strawn, and V. W. Stanton, Sr.
U.S. Patent No 3,822,555, 4 p, 5 fig, 5 ref; Offici Gazette of the United States Patent Office, V 924, No 2, p 204, July 9, 1974.

Descriptors: *Patents, *Marinas, *Breakwater Equipment, Hydraulics.
Identifiers: *Wave action, *Wave breakers.

A simplified air burst wave breaker is designed f protection against wave action in Marina install tions. The air burst unit comprises a duct in t form of two vertical U portions arranged with th openings toward each other, having a common l and in which at least the bottom free leg is long than the common leg. The lower free leg provid a water inlet stem and the upper free leg provid the air burst or burp outlet stem. The U porti opens at the bottom of an air inlet connection the upper bend thereof. Air introduced into the

nlet duct displaces water to an equal extent, substantially, from the inlet stem and the common leg of the U sections until air commences to enter the bottom of the outlet stem. The weight of the water n the outlet stem is reduced below the pressure of he water in the inlet stem with the result that the mbalance in pressure increases at a rapid rate and vater rushes into the inlet stem to fill the entire levice an in so doing, abruptly expells the air reviously accumulated in a sudden gush out of he top of the outlet stem. The pressure of the air ed to the plurality of burpers forming the breakvater chain is selected to exceed the hydrostatic ressure of the water at the selected level of subnersion of the burpers. (Sinha-OEIS)
W74-11412

8C. Hydraulic Machinery

ROST PROTECTION FOR WATERLINES.
Effluent and Water Treatment Journal, Vol 14, No , p 55, January 1974.

Descriptors: *Heat treatment, *Pipes, *Frost revention.
dentifiers: *Heater strip, England.

A new approach to the problem of frost protection f water lines has been provided by the introducion of a self-limiting heater strip available from Chemelex Heat Ltd. The heater strip consists of n electrically insulated polymeric conductive elenent in contact with two electrodes which are uitable for direct connection to a power supply. The current flows from one electrode to another cross the strip in a parallel circuitry configuration uch that the heater strip can be cut to length on ite, limited only by the maximum current rating of 0 amps per circuit. The self-limiting feature in onjunction with the parallel circuitry permits the trip to be used in any circuitry layout including vrapping over itself when tracing valves and pipe ittings. Each section of the heater strip behaves ndependently of any other section and adjusts its eat output according to its local temperature, vhich will depend on the balance between heat nput and heat loss rates. These factors depend on ipe diameter, insulation grade and thickness, and ariations in ambient temperature. The heater strip nay be used on different pipe sizes in the same lectrical circuit. (Merritt-FIRL)
W74-10910

INEARLY DECREASING VELOCITY - WEIRS,
College of Engineering, Madras (India). Dept. of Hydraulics and Water Resources.
For primary bibliographic entry see Field 5D.
W74-10927

WATER POWER APPARATUS,
O. D. Wright.
U.S. Patent No. 3,807,890, 4 p, 8 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 921, No 5, p 1994, April 30, 1974.

Descriptors: *Patents, *Water wheels, *Water utilization, Energy, Equipment, *Gates, Hydraulic gates, Spillway gates.
dentifiers: *Energy sources, *Power sources, *Water power.

The apparatus comprises a gate for directing water flowing into one side of the raceway; a power ransmitting shaft is placed in a vertical position in he raceway. Paddles are mounted on and radially positioned about the shaft. A second gate is disposed at the opposite end of the raceway to perform a similar function when the water is flowing n the opposite direction through the raceway. (Sinha-OEIS)
W74-11049

METHOD OF CLEARING A PATH THROUGH ICE,
Global Marine Inc., Los Angeles, Calif.
C. E. Bastian, Jr.
U.S. Patent No. 3,808,997, 5 p, 10 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 115, May 7, 1974.

Descriptors: *Patents, *Ice, *Navigation, *Ice-water interfaces, Equipment.
Identifiers: *Ice breakup.

An icebreaking arrangement is described in which air is applied under sufficient pressure to lower the surface of the water at an ice-water interface to a level below the bottom of the ice over an area which extends on either side of the interface. The unsupported weight of the ice in the region in which the water level is depressed produced failure and breaking off of pieces of ice at the interface. The increased pressure is produced by an air-tight platform having a downward extending skirt around the periphery, air under pressure being admitted to the region below the platform. The platform may be mounted on the bow of a ship or moved ahead of a ship to clear a channel through the ice. (Sinha-OEIS)
W74-11051

PLASTIC VALVES STAND UP TO CHLORINE.
For primary bibliographic entry see Field 5F.
W74-11123

8F. Concrete

CONCRETE ARMOR UNITS FOR PROTECTION AGAINST WAVE ATTACK, REPORT OF AD HOC COMMITTEE ON ARTIFICIAL ARMOR UNITS FOR COASTAL STRUCTURES.
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-774 800, Price $4.00 printed copy; $2.25 microfiche. Miscellaneous Paper H-74-2, January 1974, R. Y. Hudson, editor. 39 p, 42 fig, 7 tab, 2 append.

Descriptors: *Coastal engineering, *Shore protection, Jetties, Breakwaters, Design, Waves(Water), Concrete structures, Design criteria, Structural shapes.

Special-shaped concrete armor units for use in the protective cover layer of rubble-mound structures exposed to storm-wave action have been developed throughout the world in the past 20 to 25 years. Quarrystone armor units may be used when available at a competitive price and when the wave conditions at the structure site are not too severe. Design information and guidance is provided for selecting the shape and size of concrete armor units for use in constructing rubble-mound structures that will be stable at a minimum cost. The factors that determine the choice of design waves are described. A stability formula and stability coefficients are given for different amounts of damage to the structure. The casting of armor units, the problems of breakage, and the legal aspects of using concrete armor units of special shape are discussed. The tetrapod, tribar, and dolos armor units should be considered for use in the design of rubble-mound breakwaters and jetties when the use of quarrystone is not feasible. The dolos armor unit is the most efficient, and procedures for the design of a typical breakwater cross section, using these armor units for the protective cover layer, are presented. (Knapp-USGS)
W74-11209

8G. Materials

FROST PROTECTION FOR WATERLINES.
For primary bibliographic entry see Field 8C.
W74-10910

EPOXY TAR LINES BIRMINGHAM'S TRUNK,
For primary bibliographic entry see Field 8A.
W74-10920

THE USE OF STANDARD BODIES TO MEASURE THE CAVITATION STRENGTH OF WATER,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 8B.
W74-11034

STEEL PIPELINE DESIGN,
Crest Engineering Co., Tulsa, Okla.
For primary bibliographic entry see Field 8A.
W74-11119

AN EMPIRICAL STUDY OF LIGHT PATH BEHAVIOR, AND APPLICATION OF THE FINDINGS TO THE DESIGN OF PRECISE SURVEYING SYSTEMS FOR DAM ALIGNMENT.
Towill, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 8A.
W74-11212

PREDICTING CHELATE PERFORMANCE IN BOILERS,
For primary bibliographic entry see Field 5B.
W74-11380

8H. Rapid Excavation

PROTECTION OF THE ENVIRONMENT DURING DEMOLITION ACTIVITIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Weapons Effects Lab.
For primary bibliographic entry see Field 5G.
W74-11208

8I. Fisheries Engineering

CONTRIBUTIONS TO THE STUDY OF STERLET (ACIPENSER RUTHENUS RUTHENUS L.) ARTIFICIAL BREEDING: II. FRY AND FINGERLING FEEDING IN BASINS WITH CIRCULAR WATER FLOW, (IN RUMANIAN),
H. Fuhrmann, E. Fuhrmann, S. Dragasanu, and A. Cristea.
Bul Cercet Piscic. Vol 31, No 1/2, p 101-122. 1972. Illus. English summary.

Descriptors: *Fry, Fish diets.

In 1971 a breeding station was set up to produce fish for stocking the Danube in the section upstream from the Iron Gates dam (Romania). This was the first opportunity for obtaining and breeding sterlet fry. Two possibilities existed to apply methods used in sturgeon feeding. Good results were obtained in feeding fry with Enchytraeidae, Artemia salina and Chironomidae. To improve fodder consumption as well as to make possible the use of chironomids too large to be eaten as such, the following mixture was employed: 30% minced chironomids, 25% chrysalid meal, 15% fish meal, 8% meat and bone meal, 2% dried yeast and 20% water. The chironomid proportion may be diminished as the fry are accustomed to the artificial food. The coagulated fresh blood with a high protein and essential amino-acid content comparable to the most important natural food elements was consumed. Fingerling growth rate is given. The inactivated zooplankton and the fresh blood serve to improve the quality of food.--Copyright 1974, Biological Abstracts, Inc.
W74-11156

RESTORATION OF AN OYSTER RESOURCE DESTROYED BY NATURAL CAUSES,
Alabama Dept. of Conservation and Natural Resources, Montgomery.
E. May.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11130, $3.00 in paper copy, $2.25 in microfiche. Completion Report NOAA-73052112, July 1972. 4 p, 1 fig.

Descriptors: *Anaerobic conditions, *Oysters, *Planting management, Fish, Shellfish, Fishkill, Dissolved oxygen, Fisheries.
Identifiers: Mobile Bay(AL).

A naturally occurring area of low dissolved oxygen concentration, discovered on August 4, 1971 in Pt. Clear Reef in Mobile Bay, Alabama resulted in a fish kill estimated at 10,588,705 fish, shrimp and crab. The anaerobic condition was not the result of water pollution as this episode has recurred in this area for more than 100 years but rarely resulted in fish kills. The August 1971 period of low oxygen in the bottom waters caused a 95% mortality of the oysters. In order to replace the lost resource, cultch material was planted in a more suitable area in the vicinity, on a portion of Whitehouse Reef. This reef had not been productive because of the lack of cultch material, however it contains a firm bottom and the area has shown no problem with low dissolved oxygen or pollution. Approximately 439 barrels of marsh clam shells were planted per acre on 253.4 acres of the area by the Alabama Department of Conservation and Natural Resources and the site is expected to yield seed oysters and commercial harvest. (Auen-Wisconsin)
W74-11163

CONNECTICUT RIVER ECOLOGICAL STUDY--A STUDY OF THE RATE AND PATTERN OF SHAD MIGRATION IN THE CONNECTICUT RIVER--UTILIZING SONIC TRACKING APPARATUS,
McGill Univ., Montreal (Quebec). Dept. of Biology.
W. C. Leggett, and R. A. Jones.
Available from NTIS, Springfield, Va 22161 as COM-73-11043, Price $3.00 printed copy; $2.25 microfiche. Essex Marine Laboratory Report No 5, February 1973. 118 p, 32 fig, 7 tab, 18 ref.

Descriptors: *Fish migration, *Connecticut River, Fish barriers, Connecticut, Salinity, Saline water-freshwater interfaces, Fisheries.
Identifiers: *Shad, Commercial fisheries.

The rates and patterns of movement of adult shad in the Connecticut River were determined with particular reference to the important commercial fishing area located in the lower 45 km of the river, the heated water discharge are of the Connecticut Yankee Atomic Power Company's powerplant at Haddam Neck, and in the nonchanneled area of the river north of Hartford. Two hundred and thirty shad were fitted with ultrasonic tags; 27 in 1967, 115 in 1968, and 88 in 1969. The migration is complex in nature, with considerable deviation from a straight line, continuous upriver migration. Soon after entering the river from the sea, shad begin to experience the effects of rapid reductions in salinity. These changes in the physical environment are reflected in greatly reduced swim speeds and prolonged meandering at the region of the salt-freshwater interface. Shad are very vulnerable at this stage in the migration, being both weakened and, presumably, concentrated because of the barrier effect of the interface which impedes their progress for up to 70 or more hr. Once through the salt-freshwater interface and fully freshwater-adapted, the migrations become more vigorous and more direct. Shad favor the channeled areas of the river; this has considerable importance with respect to the situating of industrial intake and discharge structures in relation to the river channels. (Knapp-USGS)
W74-11227

KENTUCKY LAKE COMMERCIAL CATFISH CATCH ANALYSIS,
Murray State Univ., Ky. Biological Station.
P. J. Matthai.
Available from NTIS, Springfield, Va., 22161, as COM-73-11185, Price $3.50 printed copy; $2.25 microfiche. Kentucky Department of Fish and Wildlife Resources, Frankfort, Project Report 4-70-R, June 30, 1972. 51 p, 3 fig, 24 tab, 7 ref.

Descriptors: *Catfishes, *Kentucky, *Commercial fish, Fish harvest, Fish populations, Lake fisheries, Creel census.
Identifiers: *Kentucky Lake(KY), Blue catfish.

The total catch of fish from Kentucky Lake of commercial fishermen was studied as the fish were caught. Age, growth, and condition of blue and channel catfish were compared with previous data. A total of 497 bait lines captured 3595 fish of 14 species in 1970-71, and 531 lines captured 4611 fish of 13 species in 1971-72. Blue and channel catfish constituted 92 to 95% of the total catch. A total of 141 gill nets captured 401 fish of 11 species during the first year, and 155 gill nets yielded 453 fish of 11 species during the second. Percentage compositions of the five most numerous species in 1970-71 were: buffalofishes, 42%; blue catfish, 15%; carp and freshwater drum 13% each; and paddlefish, 11%. Comparatively, the compositions in 1971-72 were: buffalofishes, 41%; paddlefish, 20%; carp, 15%; blue catfish, 8%; and freshwater drum, 6%. Comparison of calculated weights of the two species between 10 and 20 inches inclusive shows that blue catfish attainments exceeded those of channel catfish by 8%. Channel catfish condition indices exhibited a slow decline from 32.4 to 30.8, while those of the blue channel catfish were experiencing some degree of retardation, whereas the blue catfish experienced little or no impairment. Comparison with average seven-year length attainments computed for previous surveys indicated that average attainment by channel catfish of the present survey was approximately 4% below that of the preceding study in Kentucky Lake, Kentucky; 26% above that of the Kentucky Lake, Tennessee, study; and 3% below those of both the Norris Reservoir and Watts Bar surveys. (Knapp-USGS)
W74-11434

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 22
NOVEMBER 15, 1974

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W74-11451 -- W74-12000

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 7, NUMBER 22
NOVEMBER 15, 1974

W74-11451 -- W74-12000

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

SURFACE PROPERTIES OF WATER,
Rochester Inst. of Tech., N.Y.
For primary bibliographic entry see Field 2K.
W74-11640

MOLECULAR MECHANISMS OF CONDUCTION AND POLARIZATION IN WATER VAPOR, LIQUID WATER, AND ICE,
Massachusetts Inst. of Tech., Cambridge. Insulation Research Lab.
A. Von Hippel.
Available from NTIS, Springfield, Va. 22161 as AD-762 060, Price $3.00 printed copy; $2.25 microfiche. Technical Report 12, May 1973. 27 p, 22 fig, 1 tab, 51 ref. ONR Contract N00014-67-A-0204-0053.

Descriptors: *Water properties, *Electrical properties, Electrolytes, Hydrogen bonding, Ice, Water vapor, Electrical conductance, Electrical resistance, Resistivity, Electrochemistry, Ionization, Physics, Water structure.

The molecular processes in water, vapor, and ice of conduction and polarization are discussed. The prerequisite for thermal ionization is the formation of association complexes that allow subsequent dissociation by infrared vibrations. In first approximation the ionization equilibrium can be treated by a bimolecular reaction equation; foreign ions and molecules can act as catalysts or suppressors. The corresponding process occurs in water and data are available for a more detailed analysis. The temperature and pressure dependence of the ionic product shows that the ionization by vibrations becomes increasingly difficult at high temperatures. It seems likely that the proton behaves classically, because its mass is greatly increased by a 'proton polaron' effect. Perfect ice single crystals seem to be insulators. Ionic-defect-pair formation in perfect ice single crystals may be much more expensive than previously assumed, because the partners are unshielded against each other; the migration of the defects seems to be interdicted by antipolarization; and the proton polaron effect would prevent tunneling. (Knapp-USGS)
W74-11744

2. WATER CYCLE

2A. General

A BAYESIAN APPROACH TO HYDROLOGIC TIME SERIES MODELING,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W74-11456

FLOOD FREQUENCY ESTIMATION IN NORTHERN SPARSE DATA REGIONS,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 4A.
W74-11459

UNIT HYDROGRAPHS FOR CATCHMENTS OF DIFFERENT SIZES AND DISSIMILAR REGIONS,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
R. G. Heerdegen, and B. M. Reich.
Journal of Hydrology, Vol 22, No 1/2, p 143-153, June 1974. 5 fig, 2 tab, 13 ref.

Descriptors: *Unit hydrographs, *Watersheds(Basins), *Rainfall-runoff relationships, *Geographical regions, Hydrology, Hydrograph analysis, Storm runoff, Drainage areas, Small watersheds, Forest watersheds, Floods, *Pennsylvania, Appalachian mountain region.
Identifiers: *Ungaged watersheds.

A study was made of 96 flood events, larger than the mean annual flood, from 17 catchments situated in different regions of the Commonwealth of Pennsylvania, an area of widely differing geology, physiography and climate. The mean annual precipitation ranges from 90 to 124 cm, mean monthly temperatures vary from a minimum of -3 C in January to 24C in July, and mean elevation differences within a catchment range from 220 to 875 m; catchment sizes are 10 to 450 sq km. Unit hydrographs, derived by the least-squares method on a digital computer, show some consistency of shape for one catchment but very considerable variations among catchments. Storm parameters seem to have small effects on the unit hydrographs but physiographic parameters cause the major inter-catchment variations in the shapes of the unit hydrographs. The baselength of the unit hydrograph is found to be closely related to the physiographic region while the time-to-peak and the peak discharge seem to be dependent on area and other associated physiographic parameters. It is possible within the ranges of catchment size and physiographic regions studied to develop unit hydrographs for ungaged watersheds, from which flood hydrographs and characteristic discharges may be derived. (Humphreys-ISWS)
W74-11466

A CONTRIBUTION TO STATISTICAL DEPTH-DURATION-FREQUENCY ANALYSIS,
Cagliari Univ. (Italy). Inst. of Hydraulics.
For primary bibliographic entry see Field 2B.
W74-11469

WHAT IS, AND WHAT IS NOT, A MARKOV CHAIN,
Lancaster Univ., Bailrigg (England). Dept. of Mathematics.
E. H. Lloyd.
Journal of Hydrology, Vol 22, No 1/2, p 1-28, June 1974. 7 tab, 6 ref.

Descriptors: *Markov processes, *Mathematical models, *Statistical models, *Synthetic hydrology, Statistical methods, Probability, Mathematics, Model studies, Stochastic processes, Time series analysis.

The expository paper was written in response to the increasing use of Markovian models to represent hydrological phenomena. The more familiar properties of simple (1-step) Markov chains are outlined, non-simple (k-step) chains and bivariate chains are described, and some fallacies associated with the transition probabilities of non-Markov chains are discussed. Some attention is devoted to the problems of selecting a model for use in practical situations. (Humphreys-ISWS)
W74-11470

VARIABLE UNIT HYDROGRAPH,
Ontario Ministry of Natural Resources, Toronto. Conservation Authorities Branch.
J. Y. Ding.
Journal of Hydrology, Vol 22, No 1/2, p 53-69, June 1974. 8 fig, 1 tab, 19 ref.

Descriptors: *Unit hydrographs, *Flood routing, *Watersheds(Basins), *Rainfall-runoff relationships, Hydrography analysis, Rates, Recession curves, Routing, Runoff, Storm runoff, Hydrologic models.

A three-parameter, nonlinear, generalized Muskingum routing model is solved by the direct integration method. A two-parameter, variable instantaneous unit hydrograph (IUH) model is obtained from the generalized Muskingum model by the S-hydrograph method. The ordinates of the variable IUH vary directly and the time elements inversely, with the intensity of effective rainfall raised to a power between zero and one. The method of differential correction is used to obtain estimates of the model parameters from complex storm events. (Humphreys-ISWS)
W74-11471

FLOW SIMULATION SYSTEM,
Metropolitan Sanitary District of Greater Chicago, Ill., Industrial Waste Div.
For primary bibliographic entry see Field 2E.
W74-11477

EXTENT AND DEVELOPMENT OF URBAN FLOOD PLAINS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4C.
W74-11492

SYMPOSIUM ON HYDROMETRY, VOLUME I AND II.
For primary bibliographic entry see Field 7B.
W74-11493

MEASUREMENT OF DISCHARGE AS INFLOW INTO LEAKY RESERVOIRS,
Agricultural Research Service, Riesel, Tex.
For primary bibliographic entry see Field 7B.
W74-11529

HYDRAULIC MODEL STUDY TO DETERMINE A STAGE-DISCHARGE RELATIONSHIP,
Snowy Mountains Hydro-Electric Authority, Cooma (Australia).
For primary bibliographic entry see Field 2E.
W74-11531

EARTH SATELLITES AND THEIR APPLICATIONS IN HYDROMETRY AND HYDROLOGY,
National Environmental Satellite Center, Suitland, Md.
For primary bibliographic entry see Field 7B.
W74-11553

GEOLOGIC IMPLICATIONS,
Iowa State Univ., Ames. Dept. of Earth Science.
For primary bibliographic entry see Field 6B.
W74-11580

COMPUTER MODEL FOR DETERMINING BANK STORAGE AT HUNGRY HORSE RESERVOIR, NORTHWESTERN MONTANA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11732

STUDIES ON RUNOFF CHARACTERISTICS IN CHANNEL NETWORK SYSTEMS IN LOW LAND,
E. Toyokuni, and M. Watanabe.
Memoirs of the Ehime University, Section III, Engineering, Vol 8, No 1, p 29-48 1974. 23 fig, 1 tab, 10 ref.

Descriptors: *Measurement, *Runoff, *Simulation analysis, *Model studies, Inundation, Discharge, Surface waters, *Open channel flow.
Identifiers: Channel networks, *Japan(Low lands), Water surface gradients.

The methods of discharge measurement for open-channels in low land, using the data of water surface gradient and water stage, are discussed with

respect to the fundamental equation for unsteady flow. These are examined by hydraulic experiments. A runoff model of channel network systems is investigated and is verified. Using this simulation model, the characteristics of channel flow associated with inundation and the runoff characteristics are researched by means of digital simulation, increasing the applications of this model. (Murphy-FIRL)
W74-11865

THE ILLINOIS URBAN DRAINAGE AREA SIMULATOR, ILLUDAS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5B.
W74-11889

URBAN RUNOFF BY LINEARIZED SUBHYDROGRAPHIC METHOD,
Dalton-Dalton-Little-Newport, Inc., Cleveland, Ohio.
J-S. Chien, and K. K. Saigal.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY8, Proceedings Paper 10766, p 1141-1157, August 1974. 6 fig, 1 tab, 19 ref, 2 append.

Descriptors: *Urban runoff, *Urban hydrology, *Hydrologic models, *Hydrograph analysis, Runoff, Storm runoff, Surface runoff, Urban drainage, Mathematical models, Mathematics, Design, Hydrologic data, Analytical techniques, Drainage, Rainfall-runoff relationships, Watersheds(Basins), Recession curves, Routing, Runoff coefficient, Time of concentration, Hydraulics, Hyetographs, Rainfall, Graphical analysis.
Identifiers: *Linearized subhydrographs, Superposition, Subbasins.

A simple and accurate hydrography method for practical application in engineering offices was developed utilizing the principle of mass conservation, simple parameters, and functional relationships between rainfall and runoff. Runoff coefficient was used to compute the peak rates of runoff. Linear variation of the rising limb and the receding limb of the subhydrographs for a small basin was assumed. Kinematic wave time to equilibrium was used as a factor for the determination of subhydrographs. The method was applied to the typical urban drainage basin at Oakdale Avenue, Chicago, for two storms. The predicted hydrographs and the recorded hydrographs were in good agreement in time synchronization, and the predicted peak rates of runoff were close to the recorded ones. (Humphreys-ISWS)
W74-11890

SEEPAGE IN MISSISSIPPI RIVER BANKS: REPORT 1, ANALYSIS OF TRANSIENT SEEPAGE USING A VISCOUS-FLOW MODEL AND THE FINITE DIFFERENCE AND FINITE ELEMENT METHODS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 4A.
W74-11989

2B. Precipitation

THE USE OF RADAR IN URBAN HYDROLOGY,
McGill Univ., Montreal (Quebec). Stormy Weather Group.
For primary bibliographic entry see Field 2E.
W74-11468

A CONTRIBUTION TO STATISTICAL DEPTH-DURATION-FREQUENCY ANALYSIS,
Cagliari Univ. (Italy). Inst. of Hydraulics.
C. Cao.
Journal of Hydrology, Vol 22, No 1/2, p 109-129, June 1974. 8 fig, 5 tab, 9 ref.

Descriptors: *Rainfall disposition, *Statistical methods, *Duration curves, *Hydrologic data, Frequency curves, Frequency analysis, Mathematics, Stochastic processes, Data processing, Networks, Rainfall, Stations, Time.
Identifiers: *Sardinia, *Depth-duration-frequency analysis.

Present methods of evaluating the depth-duration-frequency relationship to be assumed for any given location are not completely satisfactory because of the uncertainty due to the low density of recording station networks and the assumed significance of every difference between stations. A new procedure is suggested with the aim of taking full advantage of all the information at hand. The procedure is based on the grouping of stations exhibiting homogeneous characteristics and on the use of the one-day rainfall characteristics available from the much more numerous non-recording stations. Station grouping is accomplished under rigorous statistical control by means of analysis of variance theory while a convenient statistical criterion is given to relate the one-day depth distribution to the shorter duration depth characteristics. Moreover, a new method for the depth-duration-frequency analysis of point rainfall is suggested on the basis of linear regression theory. Although not completely rational from a statistical point of view, because of the lack of independence between observations, the method is believed to be superior to the ones commonly used. As an example, an application to the 35 stations in the rain-gauge network of Sardinia is reported. (Humphreys-ISWS)
W74-11469

RECORDING AND TELETRANSMISSION OF MEASURED DATA IN HYDROLOGY AND RELEVANT WMO ACTIVITIES,
For primary bibliographic entry see Field 7B.
W74-11559

A MULTISOURCE ATMOSPHERIC TRANSPORT MODEL FOR DEPOSITION OF TRACE CONTAMINANTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11651

STRUCTURE AND MODIFICATION OF CLOUDS AND FOGS,
State University of New York, Albany.
For primary bibliographic entry see Field 3B.
W74-11745

RAINFALL INTENSITIES IN THE CONTERMINOUS UNITED STATES AND HAWAII (SUPPLEMENT 1 TO ETL-SR-72-5: DISTRIBUTION OF MEAN MONTHLY PRECIPITATION AND RAINFALL INTENSITIES),
Army Engineer Topographic Labs., Fort Belvoir, Va. Geographic Sciences Lab.
T. E. Niedringhaus.
Available from NTIS, Springfield, Va. 22161 as AD-775 459, Price $3.25 printed copy; $2.25 microfiche. Report ETL-SR-74-3, November 1973. 28 p, 18 fig, 8 ref.

Descriptors: *Rainfall intensity, *Maps, *United States, Depth-area-duration analysis, Probability, *Precipitation intensity, Statistics, *Hawaii.

Maps are presented to show the distribution of rainfall intensities for duration of 5, 30, and 60 minutes and return periods of 10, 25, and 100 years within the conterminous United States and Hawaii. Data for excessive precipitation from 54 United States weather stations were also subjected to extreme value analysis. The extreme value analysis suggested that the Great Plains may have somewhat higher intensities than indicated on the map and that the 5-minute intensities are somewhat more variable over short distances than are the 30-minute intensities. The highest rainfall intensities occurring within the study area are in Hawaii where some mountainous sections can expect 8 inches of rain within a 60-minute period at least once every 100 years. Information is also presented on the relationship between rainfall intensity and raindrop size. (Knapp-USGS)
W74-11747

SPLASH (SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES): 1. LANDFALL STORMS,
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2E.
W74-11776

HYDROLOGIC IMPACT OF TROPICAL STORM AGNES,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
E. T. Engman, L. H. Parmele, and W. J. Gburek.
Journal of Hydrology, Vol 22, No 1/2, p 179-193, June 1974. 11 fig, 2 tab, 12 ref.

Descriptors: *Hydrologic data, *Hydrologic aspects, *Watersheds(Basins), *Hurricanes, Hydrographs, Floods, Surface runoff, Rain, *Pennsylvania, Appalachian Mountain Region, Storms, Hydrology.
Identifiers: *Hurricane Agnes, East Mahantango Creek Watershed(Pennsylvania).

The greatest rainfall amounts from the June 1972 tropical storm that devastated the Susquehanna river valley occurred over the East Mahantango Creek Watershed. This 162 sq mile area in the Ridge and Valley Province of eastern Pennsylvania is a densely instrumented research watershed, operated by the Agricultural Research Service of the USDA. Instrumentation includes 33 20-inch capacity, digital recording rain gages, and seven stream gaging sites. Data from tropical storm Agnes were analyzed with respect to watershed yield and return period frequency. Antecedent conditions and events preceding the storm are discussed. The maximum rainfall in this storm was 14.9 inches for 24 h and 18.2 inches for the entire storm (3 days). Partial and complete runoff records are presented for areas of 162, 76.1, 44.6, 10.1, 2.77 and 0.76 sq miles. The peak flow at the 162-sq mile point was over 400 csm (cu ft/sec/sq mile) and at the 10.1-sq mile watershed, over 1,200 csm. The rainfall and runoff events were several times greater than those expected for return period frequency of 100 years. Data from the 2.77-sq mile watershed indicate that runoff rates in the latter part of the storm were approximately equal to the rainfall rates. (Humphreys-ISWS)
W74-11892

EVAPORATION LOSSES FROM CONTAINERS OF HELLMANN PRECIPITATION GAUGES,
Eidgenoessische Technische Hochschule, Zurich (Switzerland).
B. Sevruk.
Hydrological Sciences Bulletin, Vol 19, No 2, p 231-236, Jun 1974. 3 fig, 1 tab, 29 ref.

Descriptors: *Precipitation gauges, *Evaporation, Rain gauges, Precipation(Atmospheric), Instrumentation, Water loss, Regression analysis, Temperature.
Identifiers: *Hellmann precipitation gauge.

The evaporation losses from the container of an old galvanized Hellmann gauge, 7.1 sq cm aperture area, were five times greater than the losses from the container of a new gauge, 1.8 sq cm aperature area, of almost the same grey color. The maximum evaporation from the old gauge amounted to 0.75 mm per day. The same evaporation losses in the

Baye of Montreux basin over a period of 10 years from April to September amounted to 0.09 mm per measurement or to 0.7 per cent of the precipitation catch. There was a relationship between the monthly percentage evaporation losses and the ratio of evaporation time and rainfall duration. (Humphreys-ISWS)
W74-11909

2C. Snow, Ice, and Frost

FLOOD FREQUENCY ESTIMATION IN NORTHERN SPARSE DATA REGIONS,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 4A.
W74-11459

MEASUREMENT OF DISCHARGE UNDER ICE COVER,
Water Survey of Canada, Winnipeg (Manitoba).
For primary bibliographic entry see Field 7B.
W74-11511

ESTIMATION OF STREAMFLOW UNDER ICE COVER,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 2E.
W74-11512

SNOW AND FROST DEPTHS ON NORTH AND SOUTH SLOPES,
Forest Service (USDA), La Crosse, Wis. Watershed Lab.
R. S. Sartz.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-226 473, $2.75 in paper copy, $2.25 in microfiche. Forest Service Research Note NC-157, 1973. 2 p, 1 tab, 2 ref.

Descriptors: *Frost, *Snow cover, *Slopes, Topography, Freezing, Frozen ground, Solar radiation.
Identifiers: *Slope aspect.

Aspect affects soil frost depth by influencing the amount of solar radiation received at the ground or snow surface. Depending on the conditions, frost can be of equal depth on north and south slopes, deeper on north slopes, or deeper on south slopes. (Knapp-USGS)
W74-11724

FATE AND EFFECTS OF OIL POLLUTANTS IN EXTREMELY COLD MARINE ENVIRONMENTS,
California Inst. of Tech., Pasadena. Jet Propulsion Lab.
For primary bibliographic entry see Field 5B.
W74-11725

STUDIES OF THE INNER SHELF AND COASTAL SEDIMENTATION ENVIRONMENT OF THE BEAUFORT SEA FROM ERTS-1,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W74-11728

MOLECULAR MECHANISMS OF CONDUCTION AND POLARIZATION IN WATER VAPOR, LIQUID WATER, AND ICE,
Massachusetts Inst. of Tech., Cambridge. Insulation Research Lab.
For primary bibliographic entry see Field 1B.
W74-11744

SOME RADIATION AND TEMPERATURE CHARACTERISTICS OF THAWING OF SNOW DURING THE WINTER OF 1959-60,
U. I. Antropova.
Available from NTIS, Springfield, Va. 22161 as TT72-51063, Price $3.25 printed copy; $2.25 microfiche. Indian National Scientific Documentation Centre TT72-51063, New Delhi, 1973. 34 p, 2 fig, 13 tab, 21 ref. (Translation of Trudy, Sredneaziatskogo Nauchno-Issledovatel'skogo Gidrometeorologicheskogo Instituta, Vol II, p 73-93, 1963.)

Descriptors: *Snowmelt, Temperature, Albedo, Snow cover, Snowpacks, Snow surveys, Meteorological data, Remote sensing, Runoff forecasting, *Solar radiation, *Air temperature, *Thawing.
Identifiers: USSR.

Thawing of snow under any meteorological conditions can be calculated from the solar radiation and average daily temperature of air. The following information from high-altitude stations is necessary: average daily temperature of air; form and amount of overall and low cloudiness; duration of solar radiation; amount, type, and time of precipitation; and visual determinations of the structure and moisture content of snow, and the degree of contamination of the surface. The actual value of the albedo of snow cover must be determined. (Knapp-USGS)
W74-11765

ICE DEVELOPMENT ON LAKE CHAMPLAIN,
Vermont Univ., Burlington. Dept. of Geography.
For primary bibliographic entry see Field 2H.
W74-11772

GREAT LAKES ICE COVER, WINTER 1970-71,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
R. A. Assel.
Available from NTIS, Springfield, Va. 22161 as COM-73-11023 Price $3.00 printed copy; $2.25 microfiche. Technical Memorandum NOS LSC D 4, September 1972. 76 p, 66 fig, 2 tab.

Descriptors: *Ice cover, *Great Lakes, *Lake ice, Iced lakes, Surveys, *Data collections, Limnology.

Visual aerial ice reconnaissance flights over the Great Lakes provided data from which 59 ice charts depicting ice cover extent and characteristics were constructed. Temperatures were generally below normal during the 1970-71 winter. Bay and harbor ice formation was first reported November 25, 1970 on Lake Superior. The time of greatest ice extent for individual Great Lakes varied from February to March. During this period maximum ice covers were estimated to be: Lake Superior, 48 percent; Lake Michigan, 27 percent; Lake Huron, 45 percent; Lake Erie, 92 percent; and Lake Ontario, near 10 percent. Ice covers began to diminish by early March, mainly on the lower lakes. By the end of April all lakes were relatively ice free; however, ships continued to experience problems with ice as late as May 8 in eastern Lake Erie and May 12 at the Soo locks. (Knapp-USGS)
W74-11777

APPLICATION OF THERMAL IMAGERY TO THE DEVELOPMENT OF A GREAT LAKES ICE INFORMATION SYSTEM,
National Aeronatucs and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 7B.
W74-11784

2D. Evaporation and Transpiration

THE EFFECT OF INORGANIC NUTRIENTS ON WATER ECONOMY AND HARDINESS OF CONIFERS: I. THE EFFECT OF VARYING POTASSIUM, CALCIUM AND MAGNESIUM LEVELS ON WATER CONTENT, TRANSPIRATION RATE AND THE INITIAL PHASE OF DEVELOPMENT OF FROST HARDINESS OF PINUS SILVESTRIS L. SEEDLINGS,
Lund Univ. (Sweden). Dept. of Plant Physiology.
L. Christersson.
Stud For Suec. 103, p 1-26, 1973. Illus.

Descriptors: *Transpiration, *Scotch pines, Nutrients, Inorganic compounds.
Identifiers: Frost hardiness, Seedlings.

A hardening period of 3 wk (short days:8 hr light, and low temperature:3C) decreased the water content of the shoots by 1-6%, and the transpiration rates by about 50%. Increased K content increased the water content of the shoot, but decreased the transpiration rate. Increased Mg content increased the water content, but did not affect transpiration rate. Increased Ca content had no significant effect on water content or transpiration rate. Different contents of K, Ca and Mg had very little or no effect on frost hardiness in unhardened or 3-wk hardened seedlings. A transport of K from the root to the shoot during hardening was demonstrated; this transport is discussed in connection with winter survival.--Copyright 1974, Biological Abstracts, Inc.
W74-11648

AN EVALUATION OF FARM IRRIGATION PRACTICES AS A MEANS TO CONTROL THE WATER QUALITY OF RETURN FLOW,
Utah State Univ., Logan.
For primary bibliographic entry see Field 3C.
W74-11681

EVAPORIMETRY IN THE CANAL ZONE: PART II, COMPARISON OF VARIOUS TYPES OF EVAPORIMETERS ON AN HOURLY BASIS,
Army Tropic Test Center, APO New York 09827.
W. H. Portig.
Available from NTIS, Springfield, Va. 22161 as AD-763 205, Price $3.00 printed copy; $2.25 microfiche. Report No 7301001, August 1972. 23 p, 8 fig, 4 tab, 9 ref, 3 append. ARPA Order No 740.

Descriptors: *Evaporimeters, *Tropical regions, *Canal zone, Instrumentation, Calibrations, Humid climates, *Measurement.

Instrumentation available for measuring evaporation was evaluated in Panama, and serious deficienceis were found. Measurements using the Standard Pan and Wild, Livingstone, and Piche evaporimeters were compared. Evaporation loss was greatly influenced by differences in measuring instruments used as well as by location, elevation, size of blotting paper, sheltering, and amount of radiation. Different types of evaporimeters produce different measurements, and none has been adequately related to natural evaporation. (Knapp-USGS)
W74-11740

A STUDY OF THE TRANSPIRATION INCREASING EFFECT OF WIND,
Research Inst. for Soil Melioration and Irrigation, Szarvas (Hungary).
S. Szlovak.
Acta Agron Acad Sci Hung. Vol 22, No 1/2 p 241-245. 1973.

Descriptors: *Transpiration, Corn(Field), Wind velocity, Soil moisture.

Maize plants were exposed in a wind tunnel to winds of different velocities, in light and dark, and

with different soil moisture contents, and their transpiration losses compared with wind-free controls. In all cases increasing wind velocity increased transpiration losses, though the relationship was not linear.--Copyright 1974, Biological Abstracts, Inc.
W74-11864

2E. Streamflow and Runoff

UNIT HYDROGRAPHS FOR CATCHMENTS OF DIFFERENT SIZES AND DISSIMILAR REGIONS,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W74-11466

THE USE OF RADAR IN URBAN HYDROLOGY,
McGill Univ., Montreal (Quebec). Stormy Weather Group.
G. L. McGill, and L. B. Austin.
Journal of Hydrology, Vol 22, No 1/2, p 131-142, June 1974. 6 fig, 2 tab, 10 ref.

Descriptors: *Urban hydrology, *Weather patterns, *Radar, *Remote sensing, Cities, Storms, Timing, Weather data, Weather, Precipitation(Atmospheric), Rain, Weather forecasting, *Canada.
Identifiers: *Ottawa, Basement flooding.

The radar and raingauge records of summer storms occurring over the city of Ottawa between 1969 and 1972 were used to study seven events which lead to the flooding of house basements. It was found that these tended to occur as a result of slow moving storms and on one occasion due to a storm elongated in its direction of travel. These features of storm dynamics appeared to be more important than either the intensity of the storm (maximum instantaneous rainfall rate) or the total accumulation. A brief discussion of the match between the scale of resolution of the radar and the watershed scale size in urban areas is included. (Humphreys-ISWS)
W74-11468

WHAT IS, AND WHAT IS NOT, A MARKOV CHAIN,
Lancaster Univ., Bailrigg (England). Dept. of Mathematics.
For primary bibliographic entry see Field 2A.
W74-11470

VARIABLE UNIT HYDROGRAPH,
Ontario Ministry of Natural Resources, Toronto. Conservation Authorities Branch.
For primary bibliographic entry see Field 2A.
W74-11471

NONLINEAR WAVE FORCES ON HALF-CYLINDER AND HEMISPHERE,
Chicago Bridge and Iron Co., Plainfield, Ill. Marine Research and Development.
For primary bibliographic entry see Field 8B.
W74-11475

FLOW SIMULATION SYSTEM,
Metropolitan Sanitary District of Greater Chicago, Ill., Industrial Waste Div.
R. F. Lanyon, and J. Jackson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY8, Proceedings Paper 10743, p 1089-1105, August 1974. 9 fig, 5 tab, 1 ref, 2 append.

Descriptors: *Watersheds(Basins), *Model studies, *Hydrologic systems, *Runoff, Hydrologic equation, Regional analysis, Hydrology, Rainfall-runoff relationships, Discharge(Water), Hydrographs, Flood control, Flood forecasting, Hydraulics, Hydrologic properties, Surface waters, Storm drains, Urban hydrology, Peak discharge.
Identifiers: *Computer application.

The Metropolitan Sanitary District of Greater Chicago has developed a computer program system to simulate flood flows in Chicago area waterways. The basic algorithms employed in the programming are presented. Descriptions of input data requirements and output information are presented. A comparison of results with gaging records is included. The results of various test runs of the Flow Simulation System demonstrated the program's ability to reproduce past flood events and serve as justification for using the system in the analysis and design of flood control works by the Metropolitan Sanitary District. The question of transferability from watershed to watershed is a prime consideration in evaluating hydrological models. The system has proven to meet the test of transferability in the Chicago Region. All of the results presented were arrived at without modification of the programming or the constants involved. (Humphreys-ISWS)
W74-11477

QUADRATIC LOSS AND SCATTERING OF LONG WAVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11478

SYMPOSIUM ON HYDROMETRY, VOLUME I AND II.
For primary bibliographic entry see Field 7B.
W74-11493

A PORTABLE WATER-STAGE RECORDER FOR EXPERIMENTAL HYDROLOGICAL MEASUREMENTS,
Hydraulic Research Inst., Prague (Czechoslovakia).
For primary bibliographic entry see Field 7B.
W74-11497

WATER-LEVEL TRANSDUCERS,
Hydrological Services Ltd., Sydney (Australia).
For primary bibliographic entry see Field 7B.
W74-11498

STREAM GAUGING NETWORK OF THE LOWER MEKONG BASIN,
National Energy Authority, Bangkok (Thailand).
For primary bibliographic entry see Field 7B.
W74-11499

THE ANALYSIS OF THE POSSIBILITIES OF CURRENT METER OPERATION IN TURBULENT STREAMS,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 7B.
W74-11501

INSTRUMENTS FOR MEASUREMENT OF CURRENTS AND LEVELS IN NATURAL RESERVOIRS AND RIVERS,
Nauchno-Issledovatelskii Institut Gidrometeorologicheskogo Priborostroeniya, Moscow (USSR).
For primary bibliographic entry see Field 7B.
W74-11505

FLOW MEASUREMENT OF SOME OF THE WORLD'S MAJOR RIVERS BY THE MOVING-BOAT METHOD,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11506

THE EVALUATION OF DISCHARGE MEASUREMENTS IN STREAMS WITH CHANGING FLOW CONDITIONS,
Board for Water Resources Management, Luneburg (West Germany).
For primary bibliographic entry see Field 7B.
W74-11508

FLOW MEASUREMENT BY THE INTEGRATING FLOAT METHOD.
Missouri Univ., Columbia. Dept. of Civil Engineering.
For primary bibliographic entry see Field 7B.
W74-11509

ESTIMATION OF STREAMFLOW UNDER ICE COVER,
Research Inst. for Water Resources Development, Budapest (Hungary).
J. Szilagyi, and L. Muszkalay.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 228-236, 1973. 5 fig.

Descriptors: *Stage-discharge relations, *Ice cover, Ice, Discharge coefficient, Gages, Discharge(Water), Channel morphology, Discharge measurement, Water measurement, Hydrologic data, International hydrological decade.
Identifiers: *Hungary.

On watercourses where the ice cover is formed within a brief period of time, the ratio of streamflow with and without ice cover can be constructed on the basis of a sufficient number of streamflow measurements under ice. The curves thus obtained show appreciable differences, depending on the size and shape of the cross-sections. The family of curves determined from measurements can be used under the climatic and hydrological conditions prevailing in Hungary for constructing the relationship between the flow under ice and stage, if a single streamflow value measured under ice is available and the hydrology of the cross-section under consideration is well known. The coefficient allowing for the geometry and hydrological conditions of the cross-section offers the possibility, under similar circumstances, for determining this relationship even without streamflow measurement under ice and for including the effects of changes in cross-section. (See also W74-11493) (Knapp-USGS)
W74-11512

TECHNIQUES FOR MEASUREMENT OF DISCHARGE BY DYE DILUTION,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11513

STREAM HYDROGRAPHS BY FLUORESCENT TRACERS,
British Columbia Univ., Vancouver.
For primary bibliographic entry see Field 7B.
W74-11514

STREAM GAUGING WITH PORTABLE EQUIPMENT,
Research Council of Alberta, Edmonton.
For primary bibliographic entry see Field 7B.
W74-11516

LABORATORY CALIBRATION OF THE WALNUT GULCH SUPERCRITICAL FLOW-MEASURING FLUME,
Agricultural Research Service, Stillwater, Okla.
For primary bibliographic entry see Field 7B.
W74-11519

FREE SURFACE SUBCRITICAL FLOW MEASUREMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 7B.
W74-11520

FLOW OVER SIDE-WEIRS,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11521

GAUGING STATIONS ON SEDIMENT-LOADED MOUNTAIN RIVERS,
Swiss Federal Water Resources Bureau, Bern.
For primary bibliographic entry see Field 7B.
W74-11522

FLOW MEASUREMENT OF LOW-GRADIENT STREAMS IN SANDY SOILS,
Agricultural Research Service, Athens, Ga. Southeast Watershed Research Center.
For primary bibliographic entry see Field 7B.
W74-11523

MEASUREMENT AND ESTIMATION OF FLOOD DISCHARGES,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11524

THE AIR-BUBBLE METHOD OF FLOW MEASUREMENT AND ITS APPLICATION,
National Water Authority, Budapest (Hungary).
For primary bibliographic entry see Field 7B.
W74-11525

DISCHARGE MEASUREMENT IN OPEN WATER BY MEANS OF MAGNETIC INDUCTION,
Hanover State Ministry for Food, Agriculture and Forests (West Germany).
For primary bibliographic entry see Field 7B.
W74-11526

ACCURACY AND RATIONALIZATION OF RIVER DISCHARGE MEASUREMENTS,
Godudarstvennyi Gidrologicheskii Institut, Lengingrad (USSR).
For primary bibliographic entry see Field 7B.
W74-11527

A RECORDING METER FOR MEASURING THE OVERLAND FLOW,
Technische Universitaet, Dresden (East Germany). Dept. of Hydrology and Meteorology.
For primary bibliographic entry see Field 7B.
W74-11530

HYDRAULIC MODEL STUDY TO DETERMINE A STAGE-DISCHARGE RELATIONSHIP,
Snowy Mountains Hydro-Electric Authority, Cooma (Australia).
S. K. Stephens, and H. L. Stark.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 412-422, 1973. 4 fig.

Descriptors: *Stage-discharge relations, *Floods, *Rivers, *Australia, *Hydraulic models, Water measurement, Discharge measurement, Flow measurement, Stream gages, International hydrological decade.
Identifiers: *Burdekin River(Australia).

A large part of the runoff in the Burdekin River at Burdekin Falls in Queensland, Australia, is derived from floodflows which can exceed two million cusecs. Because of the difficulty of gaging flows of this order by conventional means, the stage-discharge relationship was derived by a hydraulic model study. A model was constructed based on a photogrammetric survey of approximately 3 miles of the river to an undistorted scale of 1:100. Data necessary for model verification were provided from current meter gagings for relatively low flows of up to 16,000 cusecs and flood slopes at discharges of up to about 700,000 cusecs from observations at two stage-recorder sites. The model produced a stage-discharge relationship to an accuracy of about plus or minus 5% for flows up to 1,000,000 cusecs. (See also W74-11493) (Knapp-USGS)
W74-11531

THE INTENSE EVALUATION OF DISCHARGE MEASUREMENTS BY THE EQUATIONS OF THE UNIVERSAL VELOCITY DISTRIBUTION LAW,
Bayerischer Gewaesserkundedienst Staatlich Byaerische, Munich (West Germany).
W. Unbehauen.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 865-882, 1973. 6 fig, 2 tab, 22 ref.

Descriptors: *Discharge measurement, *Velocity, *Open channel flow, *Flow measurement, Discharge(Water), Current meters, Stream gages, Flow, Flow rates, Roughness(Hydraulic), Flow characteristics, International hydrological decade.

The assumptions made in obtaining the universal velocity distribution laws are valid also for natural channels. These findings are the basis for evaluation of discharge measurements by means of the velocity distribution laws. With the help of the wall law, the turbulent shear velocities v sub * and the effective roughness k may be computed. The value k represents the total hydraulic roughness produced by turbulent friction and further additional energy losses. The additional determination of the mean shear velocity of the cross-section will provide the initial data for the computation of the mean velocities of each vertical and the total cross-section. By means of the sectional area and the velocity, the total discharge of the cross-section is determined. This procedure for evaluation of discharge also permits the determination of the hydraulic parameters v sub * and k. (See also W74-11493) (Knapp-USGS)
W74-11567

THE USE OF STATISTICAL DISTRIBUTIONS FOR DETERMINING THE MAGNITUDE AND FREQUENCY OF FLOODS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W74-11611

HYDROLOGIC DATA FOR LITTLE POND CREEK AND NORTH ELM CREEK, BRAZOS RIVER BASIN, TEXAS, 1972,
Geological Survey, Austin, Tex.
R. N. Mitchell.
Open-file report, May 1974. 37 p, 2 fig, 2 tab.

Descriptors: *Basic data collections, *Rainfall-runoff relationships, *Small watersheds, *Texas, Data collections, Hydrologic data, Hydrographs, Discharge(Water), Water resources development.
Identifiers: Little Pond Creek(TX), North Elm Creek(TX), *Brazos River basin(TX).

Rainfall and runoff data collected during the 1972 water year are presented for the 22.2-square-mile area above the stream-gaging station Little Pond Creek at Burlington, Texas, and the 48.6-square-mile area above the stream-gaging station North Elm Creek near Cameron, Texas. Instruments to collect rainfall and runoff data in the study area consist of a network of rain gages and stream-gaging stations on Little Pond Creek and North Elm Creek. Data collection began in October 1962. Continuous water-stage records at the two stream-gaging stations, Little Pond Creek at Burlington and North Elm Creek near Cameron, together with measurements of streamflow, are used to compute total runoff from each area. Low-water concrete controls at each station were constructed to stablize the low-water portion of the stage-discharge relationship. (Knapp-USGS)
W74-11733

FLOOD PROFILES OF THE LOWER HILLSBOROUGH RIVER, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. F. Turner, Jr.
Open-file report 74003, 1974. 29 p, 7 fig, 5 tab, 8 ref.

Descriptors: *Flood profiles, *Florida, Peak discharge, Flood data, Flood forecasting.
Identifiers: *Hillsborough River(FL).

Flood profiles are given for selected theoretical floods for a 10-mile reach of the lower Hillsborough River, Florida, including Tampa Reservoir. The procedures for making these flood profiles for controlled and uncontrolled flow conditions at Tampa Dam are based on flood heights computed in a step-backwater analysis. Resulting flood profiles can be used to delineate areal extent of flooding on topographic maps. This information can be utilized by governmental agencies to control flood-plain development in minimizing possible future flood losses. (Knapp-USGS)
W74-11735

LOW-FLOW CHARACTERISTICS OF SELECTED STREAMS IN THE SABINE RIVER BASIN DOWNSTREAM FROM TOLEDO BEND RESERVOIR,
Geological Survey, Baton Rouge, La.
M. J. Forbes, Jr.
Sabine River Compact Administration Publication, 1974. 9 fig, 1 plate, 2 tab, 9 ref, 2 append.

Descriptors: *Low flow, *Base flow, *Rivers, *Texas, Water yield, Duration curves, Reservoirs, Surface-groundwater relationships.
Identifiers: *Sabine River(TX).

Substantial amounts of groundwater enter stream channels of the Sabine River basin downstream from Toledo Bend Reservoir, Texas-Louisiana. This part of the basin, comprising about 20% of the total area drained by the Sabine River, contributed about 72% of the flow occurring at the gaging station near Ruliff, Tex., during a low-flow investigation in 1963. Aquifers contributing to flows in streams in this part of the basin are the Jasper, Evangeline, and Chicot. The 7-day 2- and 10-year low-flow frequency values for the Sabine River near Ruliff, Tex., are 670 and 340 cubic feet per second, respectively. Flow rates equaled or exceeded 90% of the time at the Sabine River gaging stations near Bon Wier and Ruliff, Tex., are about 290 and 600 cfs, respectively, with assumed zero release from Toledo Bend Reservoir. Low-flow frequency and flow-duration values for gaged and ungaged tributaries to the Sabine River are also presented. Prediction of low flows in the main channel of the Sabine River could be improved by more accurate determination of reservoir outflow and the establishment of a low-flow model for the main channel. (Knapp-USGS)
W74-11743

FLOODS OF JANUARY 1974 IN WASHINGTON,
Geological Survey, Tacoma, Wash.
R. J. Longfield.
Open-File report, 1974. 13 p, 3 fig, 2 tab, 1 ref.

Descriptors: *Floods, *Washington, *Historic flood, *Snowmelt, Rainfall, Peak discharge, *Flood data, Data collections.

Record floods occurred in parts of Washington during January 14-21, 1974. The floods resulted from runoff from warm, moderately heavy rain that continued most of the week, augmented by runoff from the rapid melting of near-record snowpack that extended to low elevations. New-record peak flows occurred at many gaging stations which have been operated continuously for 20 to 50 years and at one which has been operated since 1907. At lease two deaths were attributable to the floods, and property damage in the four hardest hit counties were estimated to be $21 million. (Knapp-USGS)
W74-11752

SURFACE-WATER AVAILABILITY, TALLADEGA COUNTY, ALABAMA,
Geological Survey, University, Ala.
For primary bibliographic entry see Field 7C.
W74-11767

STREAMFLOW, SEDIMENT, AND TURBIDITY IN THE MAD RIVER BASIN, HUMBOLDT AND TRINITY COUNTIES, CALIFORNIA,
Geology Survey, Menlo Park, Calif.
W. M. Brown, III.
Water-Resources Investigations 36-73, December 1973. 57 p, 21 fig, 7 tab, 42 ref.

Descriptors: *Data collections, *Hydrologic data, *California, *Sedimentation, *Streamflow, Erosion, Sediment transport, Silting, Reservoir silting, Turbidity, Runoff.
Identifiers: Mad River Basin(Calif).

The Mad River discharged an average suspended-sediment load of 2,710,000 tons per year during a 13-year period beginning October 1957. Preliminary analysis of data collected during the 1971 water year indicated that about 66% of the suspended sediment was derived from sources upstream from a proposed reservoir site on the Mad River near Butler Valley. The high rate of suspended-sediment discharge and the corresponding sediment-induced turbidity of the streamflow and constitute potential problems in the operation of the proposed reservoir. (Knapp-USGS)
W74-11770

CHARACTER AND SIGNIFICANCE OF HIGHWAY RUNOFF WATERS--A PRELIMINARY APPRAISAL,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W74-11775

SPLASH (SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES): 1. LANDFALL STORMS,
National Weather Service, Silver Spring, Md.
C. P. Jelesnianski.
Available from NTIS, Springfield, Va. 22161 as NWS TDL-46 Price $3.00 printed copy; $2.25 microfiche. Technical Memorandum NWS TDL-46, April 1972. 52 p, 19 fig, 4 tab, 14 ref, 3 append.

Descriptors: *Surges, *Tides, *Computer programs, *Wind tides, Storms, Winds, Waves(Water), Hurricanes, Storm surge.

A computer program estimates the height of potential storm surges. Two separate methods are based on dynamics. The first method, in which precomputed nomograms are used, is designed only to arrive at a peak surge value. In the second method, a dynamic model is used to compute surges along an entire coastline. Surface meteorological parameters are used as input to the operational program. (Knapp-USGS)
W74-11776

STUDIES ON MODELING OF URBAN STORM WATER RUNOFF--ON THE RELATION BETWEEN THE COMPOSITION OF BASIN MODEL AND THE EQUIVALENT ROUGHNESS,
For primary bibliographic entry see Field 5B.
W74-11855

URBAN RUNOFF BY LINEARIZED SUB-HYDROGRAPHIC METHOD,
Dalton-Dalton-Little-Newport, Inc., Cleveland, Ohio.
For primary bibliographic entry see Field 2A.
W74-11890

HYDROLOGIC IMPACT OF TROPICAL STORM AGNES,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 2B.
W74-11892

EASTERN INTENSIFICATION OF OCEAN SPIN-DOWN: APPLICATION TO EL NINO,
Scripps Institution of Oceanography, La Jolla, Calif.
W. B. White, and J. P. McCreary.
Journal of Physical Oceanography, Vol 4, No 3, p 295-303, July 1974. 4 fig, 8 ref. Naval Research Contract N000-14-69-A-0200-6043.

Descriptors: *Ocean currents, *Ocean circulation, *Mathematical models, Oceanography, Oceans, Pacific Ocean, Tropical regions, Model studies, Analytical techniques, Numerical analysis.
Identifiers: *El Nino, *Ocean spin-down, Humboldt current, Peru oceanic current, Peru coastal current, South Pacific, Eastern tropical.

This study has direct application to El Nino. The general decrease in equatorward transport of the Humboldt Current off the coast of Peru allowed for the anomalous increase in temperature by reducing the advection of cold subtropical waters. The asymmetric intensification of eastern boundary spin-down had the effect of lowering the dynamic height of the sea surface in the eastern equatorial region. This situation was conducive for the cross-equatorial transport of warm water to the south. The advection of warm interior water to the east did not seem to be allowed by the spin-down process and therefore was not considered as a source of warm El Nino waters. A mathematical model of large-scale ocean spin-down, induced by a reduction in the mean strength of the large-scale wind systems showed that spin-down of the interior ocean was intensified along the eastern boundary with de-intensification propagating in time toward the west and extending out to 1000 km after one year. The interior portions of the ocean circulation were only weakly affected. The spin-down was asymmetric, with greater de-intensification in the equatorial eastern boundary than in the poleward regions, making it appear as though the Humboldt Current was directed off-shore just south of Peru. This asymmetric aspect of gyre spin-down can be explained in terms of nondispersive Rossby waves propagating energy to the west at a faster rate near the equator than near the poles. (Humphreys-ISWS)
W74-11894

LONGSHORE CURRENTS AND THE ONSET OF UPWELLING OVER BOTTOM SLOPE,
Chicago Univ., Ill. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 2L.
W74-11896

A HYDROLOGICAL STUDY OF THE SOUTHERN SUDD REGION OF THE UPPER NILE,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 4A.
W74-11905

FLOOD CHARACTERISTICS OF OKLAHOMA STREAMS,
Geological Survey, Oklahoma City, Okla.
V. B. Sauer.
Water Resources Investigation 52-73, January 1974. 303 p, 21 fig, 4 tab, 5 ref, 2 append.

Descriptors: *Floods, *Oklahoma, Flood recurrence interval, Peak discharge, *Flood frequency, *Flood data, Regression analysis.

Floods of 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals were related to basin and climatic parameters for natural streams in Oklahoma by multiple regression techniques. One equation for each recurrence interval applies statewide for all natural streams except where manmade works, such as dams, flood-detention structures, levees, channelization, and urban development appreciably affect flood runoff. The equations can be used to estimate flood frequency of a stream at an ungaged site if drainage area size, main channel slope, and mean annual precipitation are known. At or near gaged sites, a weighted average of the regression results and the gaging station data is recommended. Individual relations of flood magnitude to contributing drainage area are given for all or parts of the main stems of the Arkansas, Salt Fork Arkansas, Cimarron, North Canadian, Canadian, Washita, North Fork Red, and Red Rivers. About two-thirds of all annual floods in Oklahoma occur during April through July. Less than one-half of one percent of annual floods occur in December. Flood records at all gaging sites in Oklahoma and some selected sites in adjacent States are presented. (Knapp-USGS)
W74-11965

SURFACE-WAVE TRANSPORT IN NONUNIFORM CANALS,
Hawaii Univ., Honolulu. Inst. of Geophysics.
For primary bibliographic entry see Field 8B.
W74-11968

FLOOD-PLAIN AREAS OF THE LOWER MINNESOTA RIVER.
Geological Survey, Saint Paul, Minn.
For primary bibliographic entry see Field 7C.
W74-11969

TIME OF TRAVEL AND DYE DOSAGE FOR AN IRRIGATION CANAL SYSTEM NEAR DUCHESNE, UTAH,
Geological Survey, Salt Lake City, Utah.
D. B. Adams.
Journal of Research of the U.S. Geological Survey, Vol 2, No 4, p 489-493, July-August 1974. 5 fig, 1 tab, 2 ref.

Descriptors: *Tracers, *Fluorescent dye, *Flow measurement, Surface-groundwater relationships, Dye releases, Streamflow, *Canals, Irrigation water, *Utah, Seepage.
Identifiers: Duchesne(UT).

A time-of-travel study was conducted in connection with seepage studies of an irrigation canal system near Duchesne, Utah. Mean velocities for the canal reaches ranged from 1.32 to 1.88 ft/s. Regression analysis of the data yielded a dye-dosage equation for the system. (Knapp-USGS)
W74-11970

GENERALIZATION OF STREAM TRAVEL RATES AND DISPERSION CHARACTERISTICS FROM TIME-OF-TRAVEL MEASUREMENTS,
Geological Survey, Washington, D.C.
C. W. Boning.
Journal of Research of the U.S. Geological Survey, Vol 2, No 4, p 495-499, July-August 1974. 1 tab, 14 ref.

Descriptors: *Dispersion, *Flow measurement, *Travel time, Path of pollutants, Dye releases,

Tracers, Streamflow, Discharge measurement, Regression analysis.

A method is given for estimating traveltime and dispersion of solutes in streams. Generalized relations for travel rates and dispersion indices as functions of stream-channel and discharge characteristics use available time-of-travel data and the multiple-regression technique. (Knapp-USGS)
W74-11971

INVESTIGATION OF DIFFUSION IN OPEN-CHANNEL FLOWS,
Geological Survey, Bay Saint Louis, Miss.
T. N. Keefer, and R. S. McQuivey.
Journal of Research of the U.S. Geological Survey, Vol 2, No 4, p 501-509, July-August 1974. 8 fig, 4 tab, 9 ref.

Descriptors: *Dispersion, *Open channel flow, *Turbulent flow, Statistical methods, Mixing, Path of pollutants, Diffusion.

The interrelation between turbulent diffusion, dispersion, and the statistical properties of turbulence in an open-channel flow was studied. The results of the study substantiate Philip's concept relating the ratio of Eulerian to estimated Lagrangian time scales and the reciprocal of the longitudinal intensity of turbulence. The relation may be used to predict coefficients of longitudinal turbulent diffusion at the water surface and in the flow field. A similar concept using an integral scale based on the longitudinal intensity of turbulence may be used to predict coefficients of both surface and depth-averaged turbulent diffusion in three coordinate directions. Longitudinal space-time velocity correlation measurements can be used to predict the Lagrangian time scale only under limited conditions. Within the range of conditions studied, longitudinal diffusion accounted for 4% to 13% of the one-dimensional dispersion process. (Knapp-USGS)
W74-11972

COON RAPIDS POOL HYDROGRAPHIC STUDY,
Geological Survey, Saint Paul, Minn.
J. K. Hicks.
Open-file report, July 1974. 6 p.

Descriptors: *Mississippi River, *Minnesota, *Hydrography, Profiles, Water levels, Reservoirs, Stage-discharge relations, Discharge(Water).
Identifiers: Coon Rapids(MN).

During periods of regulation the Coon Rapids Pool of the Mississippi River in Minnesota extends upstream from the dam approximately to U.S. Highway 52 bridge connecting Anoka and Champlin. The operating procedure is to close the gates at the dam and fill the pool about May 1 each year. During the months of May through October the gates are automatically operated to maintain the water surface at the dam at an elevation of 830.0 ft above mean sea level. About November 1, the gates are opened, draining the pool and permitting unrestricted flow through the pool area. Median monthly summer flow is 6,500 cfs. An average monthly flow of 15,000 cfs is exceeded only in a small, gradually decreasing percentage of time, from a high of 35% in May to a low of 1% in September. Water-surface elevations and depth of water at cross sections are given. (Knapp-USGS)
W74-11981

AN APPROACH TO ESTIMATING FLOOD FREQUENCY FOR URBAN AREAS IN OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 4A.
W74-11998

HYDROLOGIC DATA FOR COW BAYOU BRAZOS RIVER BASIN TEXAS, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-11999

2F. Groundwater

HYDROGEOLOGY OF THE USSR. VOLUME 4: VORONEZH, KURSK, BELGOROD, BRYANSK, ORLOV, LIPETSK, AND TAMBOV OBLASTS (GIDROGEOLOGIYA SSSR. TOM IV. VORONEZHSKAYA, KURSKAYA, BELGORODSKAYA, BRYANSKAYA, ORLOVSKAYA, LIPETSKAYA, TAMBOVSKAYA OBLASTI).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
For primary bibliographic entry see Field 4B.
W74-11453

HYDROGEOLOGY OF THE USSR. VOLUME 17: KEMEROVO OBLAST AND ALTAY TERRITORY (GIDROGEOLOGIYA SSSR. TOM XVII. KEMEROVSKAYA OBLAST' I ALTAYSKIY KRAY).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
For primary bibliographic entry see Field 4B.
W74-11454

HYDROGEOLOGY OF THE USSR. VOLUME 26. SOVIET NORTH EAST (GIDROGEOLOGIYA SSSR. TOM XXVI. SEVERO-VOSTOK).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
For primary bibliographic entry see Field 4B.
W74-11455

HYDROLOGIC INVESTIGATIONS OF THE GROUNDWATERS OF CENTRAL TEXAS USING U-234/U-238 DISEQUILIBRIUM,
Rice Univ., Houston, Tex. Dept. of Geology.
J. Kronfeld, and J. A. S. Adams.
Journal of Hydrology, Vol 22, No 1/2, p 77-88, June 1974. 5 fig, 1 tab, 18 ref.

Descriptors: *Groundwater, *Hydrogeology, *Radioactive tracers, Aquifer characteristics, Groundwater movement, Flow, Groundwater resources, Subsurface waters, Groundwater geology, Currents(Water), Areal hydrogeology, Tracers, Indicators, Analytical techniques, Uranium radioisotopes, *Texas.
Identifiers: *Disequilibrium, *Trinity acquifer.

U-234/U-238 disequilibrium was used as a natural tracer in the groundwaters of central Texas. Utilizing the analytical methods of isotope dilution and alpha-particle spectrometry in monitoring variations in the uranium isotopic activity ratios and concentrations of natural waters, the hydrogeology of the Trinity acquifer was evaluated in terms of (a) the general groundwater circulation pattern, (b) the differentiation of water bodies upon the basis of their uranium signatures, and (c) the determination of absolute flow rates beyond the age limits of other techniques. (Humphreys-ISWS)
W74-11465

AIR AND WATER FLOW DURING PONDED INFILTRATION IN A VERTICAL BOUNDED COLUMN OF SOIL,
Universite Scientifique et Medicale de Grenoble (France). Institut de Mecanique.
For primary bibliographic entry see Field 2G.
W74-11467

ON A POSSIBLE EXTENSION OF DARCY'S LAW,
Tel-Aviv Univ. (Israel). School of Engineering.
S. Schweitzer.
Journal of Hydrology, Vol 22, No 1/2, p 29-34, June 1974. 10 ref.

Descriptors: *Darcy's law, *Equations, *Groundwater, Thermal gradient, Laminar flow, Mathematics, Porous media, Hydraulic gradient, Hydraulics.
Identifiers: *Non-isothermal flow.

A method of obtaining a first order approximation to the equations governing the motion of flow through a porous medium under non-isothermal conditions is suggested. The method starts with the governing microscopic equations of flow in the pores and averages these equations over a small volume to get the equations in terms of macroscopic quantities. (Humphreys-ISWS)
W74-11472

METHOD OF ADDITIONAL SEEPAGE RESISTANCES--THEORY AND APPLICATION,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W74-11479

DIGITAL RECORDING OF WATER LEVELS WITH THE AID OF ACOUSTICS AND ITS APPLICATION TO HYDROLOGICAL PUMPING TESTS,
Bundesanstalt fuer Bodenforschung, Hanover (West Germany).
For primary bibliographic entry see Field 7B.
W74-11495

GROUNDWATER OCCURRENCE AND MOVEMENT IN THE ATHOL AREA AND THE NORTHERN RATHDRUM PRAIRIE, NORTHERN IDAHO,
Geological Survey, Boise, Idaho.
R. E. Hammond.
Available from the Idaho Dept. of Water Admin, Statehouse-Annex 2, Boise, Idaho 83707, Price $.50. Idaho Department of Water Administration, Boise, Water Information Bulletin No 35, March 1974. 19 p, 8 fig, 12 ref.

Descriptors: *Groundwater movement, *Idaho, *Hydrogeology, *Alluvial channels, Alluvium, Water levels, Transmissivity, Water yield.
Identifiers: *Rathdrum Prairie(ID).

A highly permeable aquifer occupying a buried channel (ancestral Rathdrum River) underlies the Spokane Valley of northeastern Washington and the Rathdrum Prairie and Athol areas of northern Idaho. Large quantities of water are pumped from the aquifer for irrigation, industrial, and municipal use. Natural discharge from the aquifer to the Spokane River is used for power generation. Data were collected by geophysical survey (gravity), test drilling, and mass measurements of water levels in wells. Groundwater in the aquifer moves from the Athol area to the northern Rathdrum Prairie through only two of three buried channels. About 200 million gallons per day is estimated to flow through the two buried channels--the west channel and the Chilco channel. Of this amount, about 170 million gallons per day flows through the west channel and 30 million gallons per day through the Chilco channel. Flow through the middle channel is considered negligible because the bedrock bottom of the channel is above the water table. The west channel is filled at least partly with large, loose boulders. The Chilco channel is both smaller in cross-section than the west channel and is filled with less permeable material. Use of groundwater to date has had negligible effects on water levels in the study area. (Knapp-USGS)
W74-11730

ELECTRIC-ANALOG SIMULATION NETWORK OF UNCONSOLIDATED AQUIFERS IN THE UPPER WABASH RIVER BASIN, INDIANA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 4B.
W74-11736

HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEXAS, METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
B. B. Hampton.
Open-file report, June 1974. 123 p, 3 fig, 5 tab.

Descriptors: *Urban hydrology, *Texas, *Rainfall-runoff relationships, *Basic data collections, Hydrologic data, Data collections, Cities, Storm runoff, Urbanization.
Identifiers: *Fort Worth(TX).

Hydrologic investigations on several small streams in Forth Worth, Texas are designed to evaluate factors affecting floods on small streams in the metropolitan area. The objectives of the program are to determine, on the basis of historical data and hydrologic analyses, the magnitude and frequency of floods; to document and define the areal extent of floods of greater than ordinary magnitude; and to determine the effect of urban development on flood peaks and volume. The four study areas within the metropolitan area are Sycamore Creek, Sycamore Creek tributary, Dry Branch, and Little Fossil Creek. The Sycamore Creek tributary study area includes the highly impervious area of the Seminary South Shopping Center as a subarea. Summaries of storm rainfall-runoff data for selected individual storms at streamflow stations and crest-stage partial-record stations are given in tables. Detailed storm rainfall and runoff records, hydrographs, and mass curves are compiled for each station. (Knapp-USGS)
W74-11737

DIGITAL MODEL OF THE OGALLALA AQUIFER OF THE NORTHERN PART OF THE NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Denver, Colo.
R. R. Luckey, and W. E. Hofstra.
Colorado Water Resources Circular No 24, 1974. 22 p, 12 fig, 10 ref.

Descriptors: *Mathematical models, *Aquifers, *Colorado, *Great Plains, Finite element analysis, Hydrogeology, Water levels, Water table, Withdrawal, Forecasting, Simulation analysis, *Computer models.
Identifiers: *Ogallala aquifer(CO).

A finite-difference technique was used to model the hydrology of the Ogallala aquifer under 1,400 square miles in the northern part of the northern High Plains of Colorado. The model was verified by comparing observed and calculated changes in water levels for the period 1964-71. The model was used to predict changes in water levels for the period 1964-2000. Under the assumption that there would be no groundwater development after 1970, water-level declines of from less than 10 feet to over 50 feet were predicted. Under the assumption that 610 new wells would be added during the period 1971-80, water-level declines of from less than 10 feet to over 120 feet were predicted. The model was sensitive to pumpage and specific yield but was insensitive to hydraulic conductivity. To further refine the model, pumpage and specific yield must be more accurately determined. (Knapp-USGS)
W74-11741

ESTIMATING FLOOD DISCHARGES IN NEVADA USING CHANNEL-GEOMETRY MEASUREMENTS,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 4A.
W74-11742

DETECTION OF SUBSURFACE CAVITIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 4B.
W74-11756

WELL MEASUREMENTS,
Ministry of Works, Wellington (New Zealand).
For primary bibliographic entry see Field 4B.
W74-11760

THE ROLE OF GEOLOGY AND HYDROLOGY IN GEOTHERMAL EXPLORATION,
United Nations, New York. Resources and Transport Div.
For primary bibliographic entry see Field 4B.
W74-11761

GEOPHYSICAL METHODS IN GEOTHERMAL EXPLORATION,
For primary bibliographic entry see Field 4B.
W74-11762

GEOCHEMICAL METHODS IN GEOTHERMAL EXPLORATION,
Iceland Univ., Reykajavik. Science Inst.
For primary bibliographic entry see Field 2K.
W74-11786

PUBLIC GROUNDWATER SUPPLIES IN CRAWFORD COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11880

PUBLIC GROUNDWATER SUPPLIES IN BROWN COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11881

PUBLIC GROUNDWATER SUPPLIES IN BOONE COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11882

PUBLIC GROUNDWATER SUPPLIES IN FORD COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11883

PUBLIC GROUNDWATER SUPPLIES IN HARDIN COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11884

PUBLIC GROUNDWATER SUPPLIES IN KENDALL COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11885

PUBLIC GROUNDWATER SUPPLIES IN EDGAR COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11886

PUBLIC GROUNDWATER SUPPLIES IN ALEXANDER COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11887

THE USES OF GEOPHYSICAL METHODS IN HYDROGEOLOGICAL INVESTIGATIONS IN ISRAEL,
Geological Survey of Israel, Jerusalem.
A. Issar, and A. Levanon.
Hydrological Sciences Bulletin, Vol 19, No 2, p 199-217, June 1974. 10 fig 1 tab, 10 ref.

Descriptors: *Hydrogeology, *Geophysics, *Geological surveys, *Aquifers, Groundwater geology, Geologic mapping, Groundwater, Geology, Hydrology, Subsurface mapping, Electrical studies, Exploration, Resistivity, Geologic formations, Water sources, Geologic investigations, Coastal plains, Mountains.
Identifiers: *Israel.

The most important contribution of geophysics to hydrogeological investigations in Israel is in the construction of the structural map of the top of the limestone and dolomite aquifers in the foothills region. This work was undertaken mainly by electrical resistivity methods aided by data from a few wells and gravimetric data. The knowledge gained from this investigation helped in the location of other deep wells as well as in the preparation of water development and supply plans. Important assistance was also obtained from electrical resistivity methods in the location of alluvial aquifers in the Arava valley in southern Israel as well as in the location of down-faulted limestone and dolomite blocks in the same region. Geophysics, especially the induced resistivity methods are among the most important tools in hydrogeological research. The greatest benefit is obtained from these methods when they are incorporated in a general hydrogeological investigation. The stage by stage intesification of the research followed by exploration and exploitation drilling enables progressive application of geophysical methods when each stage, based on data obtained from the prior stage, was examined and verified. (Humphreys-ISWS)
W74-11906

A MODIFIED HORTON EQUATION FOR INFILTRATION DURING INTERMITTENT RAINFALL,
University of the Witwatersrand, Johannesburg (South Africa). Hydrological Research Unit.
For primary bibliographic entry see Field 2G.
W74-11907

GROUNDWATER AND GEOLOGY OF BARAGA COUNTY, MICHIGAN,
Geological Survey, Lansing, Mich.
For primary bibliographic entry see Field 4B.
W74-11987

HYDROLOGY OF THE COLUMBIA (PLEISTOCENE) DEPOSITS OF DELAWARE: AN APPRAISAL OF A REGIONAL WATER-TABLE AQUIFER,
Geological Survey, Dover, Del.
For primary bibliographic entry see Field 4B.
W74-11993

GROUNDWATER RESOURCES OF BRAZOS AND BURLESON COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W74-11994

APPLICATION OF SURFACE GEOPHYSICS TO GROUNDWATER INVESTIGATIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11996

2G. Water In Soils

EFFECT OF SURFACE WETTABILITY ON CAPILLARY MOVEMENT OF WATER IN SOIL (VLIYANIYE SMACHIVAYEMOSTI POVERKHNOSTI NA KAPILLYARNOYE PEREDVIZHENIYE VLAGI V POCHVE),
Akademiya Nauk SSSR, Moscow. Pochvenny Institut.
V. V. Rybina.
Pochvovedeniye, No 9, p 137-141, September 1973. 4 tab, 14 ref.

Descriptors: *Wettability, *Surfaces, *Soil water movement, *Capillary action, *Capillary water, Bound water, Soil aggregates, Humus, Sands, Quartz, Pores.
Identifiers: USSR.

A relation between rate of capillary movement and wettability of pore walls was demonstrated by experiments. Treatment of a surface of quartz sand with humic substances decreases wettability and, consequently, reduces the rate of movement of capillary water. Different layers of adsorbed water were found to have a different wettability. The wettability of a material increases with the amount of loosely bound water. Assumptions regarding the mechanism of movement of capillary water in a soil pore were based on data obtained. Wettability of sand as a function of moisture content, rate of capillary rise of water in sands of different moisture content, and depth of the meniscus of a moving column of capillary water are tabulated. (Josefson-USGS)
W74-11452

AIR AND WATER FLOW DURING PONDED INFILTRATION IN A VERTICAL BOUNDED COLUMN OF SOIL,
Universite Scientifique et Medicale de Grenoble (France). Institut de Mecanique.
G. Vachaud, J. P. Gaudet, and V. Kuraz.
Journal of Hydrology, Vol 22, No 1/2, p 89-108, June 1974. 10 fig, 3 tab, 18 ref.

Descriptors: *Infiltration, *Ponding, *Unsaturated flow, *Soil water movement, Porous media, Permeability, Percolation, Induced filtration, Groundwater movement, Hydraulic conductivity, Soils, Fine aggregates, Sands, Compressible flow.

In order to study the effects of air movement and compressibility during ponded infiltration, experiments were conducted on a soil column of fine sand both with and without provision for air flow through the walls. Continuous measurements of water content changes, water pressure changes and air pressure changes at different levels were taken and analysed in order to obtain the capillary pressure and the relative permeability curves for each phase. These measurements have shown that if air cannot escape freely through the walls, there is a considerable reduction in the infiltration rate, the shape of the water profiles is significantly different, and the air pressure gradients are not negligible. (Humphreys-ISWS)
W74-11467

A NOTE ON THE RELATIONSHIP BETWEEN SIZE OF AREA AND SOIL MOISTURE VARIABILITY,
South Pacific Regional Coll. of Tropical Agriculture, Alafua (Western Samoa).
S. G. Reynolds.
Journal of Hydrology, Vol 22, No 1/2, p 71-76, June 1974. 1 fig, 2 tab, 13 ref, 1 append.

Descriptors: *Soil moisture, *Variability, *Soil surveys, *Statistics, Moisture content, Soil surface, Sampling, Data collection, Quality control, Areal, Size.

The influence of size of area on soil moisture variability in the surface 5 to 8 cm of soil is examined using thirteen plot sizes ranging from 1 sq m to 6 million sq m. The gravimetric weight basis method of moisture measurement is employed. Although size of area and moisture variability are shown to be closely related with an r squared value of 0.70, in practical terms variability is probably best considered in terms of three broad areal classes (1 to 1,000 sq m, 1,000 to 100,000 sq m and 100,000 to approx. 10 million sq m) each of which has representative values for coefficient of variation and required sample size. (Humphreys-ISWS)
W74-11473

FLOW MEASUREMENT OF LOW-GRADIENT STREAMS IN SANDY SOILS,
Agricultural Research Service, Athens, Ga. Southeast Watershed Research Center.
For primary bibliographic entry see Field 7B.
W74-11523

PHYSIOLOGICAL CHARACTERISTICS OF NEPETA TRANSCAUCASICA GROSSH. UNDER IRRIGATED CONDITIONS,
Krymskii Gosudarstvennyi Pedagogicheskii Institut, Simferopol (USSR).
G. Ya. Karpova, M. V. Sivtsev, and L. A. Khilik.
Rastit Resur. Vol 9, No 2, p 242-250, 1973. Illus.

Descriptors: *Plant physiology, Chlorophyll, Soil moisture.
Identifiers: Chlorophyllase, Mentha piperita, Nepeta transcaucasica.

The effects of various water regimes on yield and quality of Nepeta trancaucasica Grossh., and on the pigment complex of the photosynthetic apparatus were studied. 'Free' and 'bound' water was determined in irrigated and nonirrigated crops by the Gusev method. Content of chlorophylls 'a' and 'b' and carotenoids were determined photometrically, chlorophyllase, by chromatograph, and ethereal oils by an extraction method. Scatter analysis of data was used. Yield of green mass and ethereal oil content of N. transcaucasica were compared with those of Mentha piperita L. in 1969, 1970 and 1971. In both species, yield of green mass was 1.5-2 times higher under irrigated conditions; ethereal oil content tended to be lower. In irrigated specimens of N. transcaucasica Grossh., 'free' water content in leaves increased, while 'bound' water decreased; permeability of cells generally decreased; chlorophyll 'a', 'b', and carotenoids increased, with maximum pigment content in the flowering phase; lability of chlorophyll 'a' increased in comparison to that of chlorophyll 'b'. When soil moisture was continuously high, pigment content decreased in the second yr. This biphasic response indicates adaptation during the second yr.--Copyright 1974, Biological Abstracts, Inc.
W74-11649

CONSTRAINTS TO SPREADING SEWAGE SLUDGE ON CROPLAND,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W74-11701

APPLICATION OF REMOTE SENSING IN THE STUDY OF VEGETATION AND SOILS IN IDAHO,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
For primary bibliographic entry see Field 4A.
W74-11738

HERBICIDE RUNOFF FROM FOUR COASTAL PLAIN SOIL TYPES,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W74-11805

SOILS AS SLUDGE ASSIMILATORS,
Forest Service (USDA), Washington, D.C. Div. of Forest Environment Research.
For primary bibliographic entry see Field 5D.
W74-11836

THE DISTRIBUTION OF CAREX BOHEMICA SCHREB. IN THE CENTRAL BELT OF THE EUROPEAN PART OF THE USSR, (IN RUSSIAN),
For primary bibliographic entry see Field 2H.
W74-11873

UPTAKE OF MERCURIC CHLORIDE AND METHYLMERCURY CHLORIDE FROM LIQUID MEDIA BY ASPERGILLUS NIGER AND PENICILLIUM NOTATUM,
Texas Women's Univ., Denton. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W74-11877

USE OF SOUND METHODS IN DETERMINING THE PERMEABILITY COEFFICIENT OF SOIL MOISTURE, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Physics and Reclamation.
I. I. Sudnitsyn, N. A. Muromtsev, and E. V. Shein.
Biol Nauki. Vol 16 No 1 p 137-142, 1973. Illus.

Descriptors: *Soil moisture, Permeability, Filters, Sounding.
Identifiers: Gardner method, Richard method.

Two nonstationary sound methods for determining the permeability coefficient of soil moisture are compared. Porous ceramic filters were put on their axes, and upon creating rarefaction inside, the water flowed from the soil into the filters. From the rate of flow, the coefficients of the permeability of soil moisture were determined at various pressures. In the method of Gardner, hydraulic resistance of the filter and the soil sample is not considered. Thus, results obtained by this method exceed the data obtained by the Richards method.--Copyright 1974, Biological Abstracts, Inc.
W74-11893

SOIL-WATER REGIMES IN BROOKSTON AND CROSBY SOILS,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
P. W. Harlan, and D. P. Franzmeier.
Soil Science Society of America Proceedings, Vol 38, No 4, p 638-643, July-August 1974. 8 fig, 2 tab, 17 ref.

Descriptors: *Soil water, *On-site data collections, *Soil investigations, Soil moisture, Moisture content, Field capacity, Drainage effects, Groundwater, Glacial soils, Surveys, Basic data collections, Testing procedures, Hydraulic conductivity, Sampling, *Indiana.
Identifiers: *Brookston soils, *Crosby soils, Dover(Indiana).

Hydraulic conductivity and seasonal patterns of water content were measured and related to soil formation in associated very poorly drained Brookston soils (Typic Argiaquolls) and somewhat poorly drained Crosby soils (Aeric Ochraqualfs) in central Indiana. In the Brookston soil the water table was near the surface for only a short time during periods of heavy rainfall in the winter and spring. The water table then stabilized near 125 cm deep, where it was controlled by tile drains. In Crosby, also tile-drained, the water table stayed near the surface longer in the spring, then became deeper than in Brookston. The hydraulic conductivity is relatively high in the Brookston B and C and Crosby B horizons but very low in the Crosby C horizon, compact glacial till. Since downward movement is restricted in the Crosby C horizon, water tends to move laterally through the B horizon into the Brookston soil where the tile are

in more permeable horizons than they are in Crosby. Available water capacities of soils can be estimated by measuring the field water contents in a profile at the beginning of the growing season and during dry periods for several years using a soil under perennial vegetation. In these two soils, however, it appears that water movement from Crosby to Brookston and the profile storage capacity are both important in determining the water-supplying capacity of the soils. (Humphreys-ISWS)
W74-11899

A MODIFIED HORTON EQUATION FOR INFILTRATION DURING INTERMITTENT RAINFALL,
University of the Witwatersrand, Johannesburg (South Africa). Hydrological Research Unit.
S. W. Bauer.
Hydrological Sciences Bulletin, Vol 19, No 2, p 219-225, June 1974. 4 fig, 12 ref.

Descriptors: *Infiltration, *Percolation, *Hortons law, Hydrologic budget, Soil water movement, Infiltration rates, Rainfall-runoff relationships, Retention, Soil moisture, Storage capacity, Unsaturated flow, Hydrology, Hydrographs, Soil water, Groundwater, Percolating water.

A simple infiltration concept based on Horton's infiltration equation was developed for use in mathematical rainfall-runoff modeling. Horton's infiltration formula is valid only where rainfall intensity at all times exceeds infiltration and, moreover, it does not provide adequately for the handling of a variety of initial soil moisture conditions. In contrast to Horton's concept where infiltration rate is expressed as a decay function of time, a procedure is advocated that expresses the infiltration rate as a function of soil moisture storage state. The procedure permits infiltration losses during intermittent rainfall sequences to be evaluated and accommodates a range of initial soil moisture conditions. (Humphreys-ISWS)
W74-11907

SOME DATA ON SAND MOVEMENT IN THE AMU DAR'YA VALLEY, (IN RUSSIAN),
Inst. Desert, Acad. Sci. Turkm. SSR, Ashkhabad, USSR. Desert Inst., Ashkhabad (USSR).
I. P. Svintsov, and L. G. Dobrin.
Probl Osvoeniya Pustyn'. 2. p 26-31. 1973. Illus. English summary.

Descriptors: *Sands.
Identifiers: Amu darya(USSR).

According to the mean annual direction of sand movement in the river Amudar'ya valley, below Bossag (USSR), 2 zones were distinguished. Above Burdalyk, sands move towards the NW. Beneath Burdalyk, they move towards the SW.--Copyright 1974, Biological Abstracts, Inc.
W74-11916

PESTICIDE TRANSPORT AND RUNOFF MODEL FOR AGRICULTURAL LANDS,
Hydrocomp, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 5B.
W74-11920

SOIL SYSTEMS FOR MUNICIPAL EFFLUENTS - A WORKSHOP AND SELECTED REFERENCES,
East Central State Coll., Ada, Okla. School of Environmental Science.
For primary bibliographic entry see Field 5D.
W74-11924

2H. Lakes

LONG-TERM CHANGES IN THE PLANKTON OF EUTROPHIC MIKOLAJSKIE LAKE AS AN EFFECT OF ACCELERATED EUTROPHICATION,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
For primary bibliographic entry see Field 5C.
W74-11482

PROBLEMS OF FLOW MEASUREMENT IN LARGE RESERVOIRS,
Hydraulic Research Inst., Prague (Czechoslovakia).
For primary bibliographic entry see Field 7B.
W74-11532

ECOLOGICAL IMPACT OF THE IN-LINE ARRANGEMENT OF TWO RESERVOIRS AND A METROPOLITAN AREA,
Drake Univ., Des Moines, Iowa,
For primary bibliographic entry see Field 5C.
W74-11571

LOW ENERGY MECHANICAL METHODS OF RESERVOIR DESTRATIFICATION,
Oklahoma State Univ., Stillwater. School of Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W74-11572

HYPOLIMNETIC FLOW REGIMES IN LAKES AND IMPOUNDMENTS,
Pennsylvania Univ., Philadelphia. Dept. of Civil and Urban Engineering.
For primary bibliographic entry see Field 8B.
W74-11578

PRODUCTION OF ZOOPLANKTON POPULATIONS IN FRESH WATERS OF THE USSR, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
M. B. Ivanova.
Ekologiya. Vol 4, No 3, p 52-62, 1973. Illus.

Descriptors: *Zooplankton, Primary productivity, Lakes, Reservoirs, Ponds.

A critical review of studies on the calculation of the production of zooplankton in lakes, reservoirs and ponds is presented. As the index of the rate of production of different species under conditions of different biotopes it is recommended that the relation P/B (the ratio of production during a known period of time to the average biomass during this same time), which depends on temperature, food supply, and age composition of the population, be used. Most often P/B is calculated for a month, vegetative period or year, which is warranted when the production of different trophic levels in the same body of water or the production capabilities of different bodies of water is compared. When determining the dependence of the rate of production on ecological factors or comparing the increment of 1 spp. in different bodies of water is required, the daily P/B should be used.--Copyright 1974, Biological Abstracts, Inc.
W74-11708

UTILIZATION OF REMOTELY-SENSED DATA IN THE MANAGEMENT OF INLAND WETLANDS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11727

THE EFFECT OF HEATED WATER ON THE TEMPERATURE AND EVAPORATION OF HYCO LAKE, NORTH CAROLINA, 1966-72,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 5C.
W74-11751

A WATER-QUALITY RECONNAISSANCE OF BIG BEAR LAKE, SAN BERNARDINO COUNTY, CALIFORNIA, 1972-73,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W74-11753

ICE DEVELOPMENT ON LAKE CHAMPLAIN,
Vermont Univ., Burlington. Dept. of Geography.
A. O. Lind.
Available from NTIS, Springfield, Va. 22161 as N73-27281 Price $3.00 printed copy; $2.25 microfiche. Remote Sensing Laboratory Contract Report for NASA, July 1973. 3 p, 1 fig. NASA Contract 5-21753.

Descriptors: *Remote sensing, *Satellites(Artificial), *Lake ice, *Ice cover, Mapping, Data collections, Freezing.
Identifiers: *ERTS, *Lake Champlain.

One usable ERTS-1 scene was available for lake ice survey of Lake Champlain. The January 8, 1973, coverage (Image No. 1169-11521) revealed various ice tones, patterns, and arrangements as well as open water. MSS band 5 imagery provided the most useful data. While it was not possible to differentiate open water from 1-to 2-day old ice, it was possible to interpret the tonal signatures of the frozen portion in terms of freezing history or age. The dark gray tones of new, smooth, ice contrasts with the medium gray tones of older ice, and the rough texture of wind-jammed bay ice. Mapping of these ice patterns is quite feasible with moderate enlargment of the scene (2 to 3X). (Knapp-USGS)
W74-11772

DYNAMICS OF PLAYA LAKES IN THE TEXAS HIGH PLAINS,
Texas Tech Univ., Lubbock. Remote Sensing Lab.
For primary bibliographic entry see Field 7B.
W74-11774

GREAT LAKES ICE COVER, WINTER 1970-71,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
For primary bibliographic entry see Field 2C.
W74-11777

THE DISTRIBUTION OF CAREX BOHEMICA SCHREB. IN THE CENTRAL BELT OF THE EUROPEAN PART OF THE USSR, (IN RUSSIAN),
V. S. Novikov, B. I. Artemenko, I. A. Gubanov, and V. N. Tikhomirov.
Byull Mosk O-Va Ispyt Prir Otd Biol. Vol 78, No 2, p 143-145. 1973. Illus.

Descriptors: *Ponds, Plant populations.
Identifiers: *Carex bohemica, *Volga River(USSR), *USSR(Oka River).

Observations of C. bohemica (14) in the area drained by the Volga and Oka Rivers, USSR, from 1883 to the present are reviewed. Two recent new records are included: in a refuse area near a sawmill in the Kasimovskii Raion, Ryazanskaya Oblast and in the shallows of the Rybinsk Reservoir, Nekouzskii Raion, Yaroslovskaya Oblast. One patch was found in the former area, about 100 in the latter. Contrary to theories on the gradual disappearance of the plant, there is reason to expect new discoveries of the species in other regions of the Middle Volga basin, in particular in the Ivanovskaya and Vladimirskaya Oblasts. Recent dry seasons have led to substantial

decreases in the water level and the development of small ponds and shallow areas conducive to the spread of C. bohemica.--Copyright 1974, Biological Abstracts, Inc.
W74-11873

ON THE DYNAMICS OF WIND-DRIVEN LAKE CURRENTS,
International Field Year for the Great Lakes Project Office, Rockville, Md.
J. R. Bennett.
Journal of Physical Oceanography, Vol 4, No 3, p 400-414, July 1974. 13 fig, 44 ref. NSF Grant GA-33140.

Descriptors: *Lake Ontario, *Currents(Water), *Mathematical models, *Wind tides, Analytical techniques, Continuity equation, Water circulation, Theoretical analysis, Topography, Shape, Summer, Density stratification, Lakes, Upwelling, Circulation, Unsteady flow, Great Lakes, Limnology.
Identifiers: *Wind-driven currents, *Geostrophic, Linear model, Numerical model, Transient theory, Two-dimensional.

Two time-dependent 'vertical cross section models' were analyzed and applied to wind-driven currents in Lake Ontario. The models were a linear frictionless, two-level model, and a numerical model which included both friction and nonlinear terms. They predict current and temperature under the assumption that all variables except pressure are independent of the longshore coordinate. The longshore pressure gradient was computed from the condition that the volume transport normal to the cross section is zero. The quasi-static response of the linear frictionless model was studied to isolate the effects of topography and stratification on the structure of the coastal currents. It predicted that the vertically averaged longshore current was independent of both rotation and stratification. Under homogenous conditions, the strongest current was confined to a thin region near the shore. Stratification increased the width of this 'coastal jet region' and caused the flow to be more confined to the surface layer. The qualitative results of the linear model were also true for the numerical model, but the latter gave more realistic current magnitudes. The main differences between the two models were due to friction which had a relatively straight-forward damping effect on both the quasi-geostrophic and inertial oscillation components of the flow. The damping of the geostrophic mode was smaller in cases where stratification was important, because it decreased the effect of bottom friction. The models can explain many of the differences between the spring and summer regimes. (Humphreys-ISWS)
W74-11895

SOME CHARACTERISTICS OF NEARSHORE CURRENTS ALONG THE NORTH SHORE OF LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
J. O. Blanton.
Journal of Physical Oceanography, Vol 4, No 3, p 415-425, July 1974. 6 fig, 2 tab, 16 ref.

Descriptors: *Lake Ontario, *Lake Shores, *Currents(Water), Lakes, Great Lakes, Limnology, Seasonal, Spring, Summer, Autumn, Flow, Synoptic analysis, Statistics, Data processing, Winds, Thermocline, Stratification, Topography, Isotherms, *Canada.
Identifiers: Oshawa(Canada).

In three periods during 1970 representative of spring, summer and fall, the horizontal currents off Oshawa in Lake Ontario were measured at distances of 3, 6, 11, and 16 km offshore. All records were spectrally analyzed for an equal number of 2 hr values within each period. Within each season, there was a tendency for the total variance to decrease with depth and with distance offshore. Total energy at any given distance offshore was lowest in spring and highest in fall. At distances between 6 and 11 km offshore in the summer period, there was an abrupt increase offshore in the percent of total variance contained in rotary-type motion near the theoretical inertial period. The offshore increase in other seasons was much smaller in magnitude. For all seasons, flow was predominantly westward. Nearshore currents reversed from west to east flow about 6 hr after the wind changed, but farther offshore the reversal lagged the wind by about 12 hr in summer and 36 hr in fall. These observations supplemented by data of the thermal structure of Lake Ontario indicate an apparent surplus of westerly momentum in the nearshore zone of Lake Ontario's north shore. It was concluded that single-point measurements of current flow in the near-shore zone are poor indicators of the flow structure surrounding the point. (Humphreys-ISWS)
W74-11898

ON WIND-DRIVEN LAKE CIRCULATION,
Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science; and Michigan Univ., Ann Arbor. Dept. of Applied Mechanics and Engineering Science.
S. J. Jacobs.
Journal of Physical Oceanography, Vol 4, No 3, p 392-399, July 1974. 4 fig, 1 tab, 6 ref. NSF Grant GA-23016.

Descriptors: *Water circulation, *Lakes, *Currents(Water), *Mathematical models, Winds, Movement, Hydraulics, Great Lakes, Analytical techniques, Equations, Laplaces equation, Momentum.
Identifiers: Wind-driven, Ekman number, Rossby number.

The flow induced by applying a wind stress at the surface of an initially quiescent lake was considered. It was assumed that the Ekman number, based on an eddy viscosity, is small, and that the Rossby number was at most of the order of the square root of the Ekman number. Under these conditions, which are met in practice, a linear theory is applicable. The linear problem was solved using boundary layer methods. There are essentially five distinct regions: an outer region in which the horizontal velocity is independent of depth, Ekman layers at the upper and lower boundaries, a corner region at the edge of the lake at which the Ekman layers meet, and a shear layer adjacent to the corner region. Study of the Ekman layers provided the equations which hold in the outer and shear layer regions, and consideration of the corner region provided the boundary condition. The outer flow proved to be geostrophic and directed along curves of constant depth. The shear layer is needed to satisfy the boundary condition of zero net outward transport at the edge of the lake. If the wind stress is constant, or, more generally, has zero line integral around curves of constant depth, the transport is confined to the shear layer. (Humphreys-ISWS)
W74-11902

SPRING THERMOCLINE BEHAVIOR IN LAKE ONTARIO DURING IFYGL,
Woods Hole Oceanographic Institution, Mass.
G. T. Csanady.
Journal of Physical Oceanography, Vol 4, No 3, p 425-445, July 1974. 29 fig, 6 tab, 16 ref, append. NOAA contract 35152.

Descriptors: *Lake Ontario, *Thermocline, *Currents(Water), *Surveys, Great Lakes, Thermal stratification, Limnology, Physical properties, Momentum equation, Seasonal, Spring, On-site data collections, Coriolis force, Lakes, Upwelling, Movement, Mixing, Storms, Coasts, Circulation, Lake shores, Winds, Stress.
Identifiers: *International Field Year on the Great Lakes, Oshawa(Canada), Dynamical analysis, Geostrophic balance.

A dynamical analysis was presented of some observations made during the International Field Year on the Great Lakes (IFYGL) on the north shore of Lake Ontario at Oshawa. The data analysed relate to water movements during the spring thermal regime, when a warm water band at the shores surrounds a cold central lake mass. Two periods were discussed in detail which demonstrate the influence of wind-stress-impulses in generating respectively westward flow associated with a wedge-shaped spring thermocline, and eastward flow with a lens-shaped thermocline. The day to day changes in depth-integrated momentum transport in the shore zone showed most clearly the direct effects of storms. Important modifying influences were bottom friction and momentum advection by onshore-offshore water movements. The way in which the momentum was partitioned between the surface (warm) water and the underlying water mass illustrates an important effect of the Coriolis force, which effectively transfers momentum downward. Earth rotation effects were also responsible for inertial oscillations of the interface between cold and warm waters. On some occasions this interface was maintained in an inclined position by geostrophic balance between the pressure gradient and the Coriolis force. Thus, the important physical factors in spring thermocline mechanics were wind stress, stratification and Coriolis force, complicated by some more or less obvious effects of bottom friction and momentum advection. (Humphreys-ISWS)
W74-11903

CONCENTRATION OF HEAVY METALS IN SEDIMENT CORES FROM SELECTED WISCONSIN LAKES,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W74-11915

RESEARCH PROSPECTUS FOR MARINE POLLUTION CONTROL IN THE GREAT LAKES.
Kearney (A.T.), Inc., Chicago, Ill.
For primary bibliographic entry see Field 5G.
W74-12000

2I. Water In Plants

EFFECT OF CHLOROMEQUAT CHLORIDE (CCC) ON GROWTH, YIELD AND FIBRE PROPERTIES OF COTTON PLANTS GROWN UNDER VARIOUS CONDITIONS OF SOIL MOISTURE,
National Research Centre, Cairo (Egypt). Botany Lab.
M. T. El-Saidi.
Z Acker- Pflanzenbau. Vol 137, No 1, p 35-45, 1973. Illus.

Descriptors: *Cotton, Plant physiology, Fibers(Plant), Soil moisture.
Identifiers: Chloromequat chloride.

Cotton plants Gossypium barbadense (cv. 'Giza 69') were grown under different conditions of water supply in ontogenesis. Plants were exposed to water deficit at budding or at beginning of flowering or at maximum of flowering. At the time of shortage of water supply, cotton plants were sprayed with 150 mg/l of CCC. The CCC solution was applied at fine mist run off covering all aerial parts of cotton plants, without dropping any solution on the soil. CCC decreased the daily growth of the main stem of cotton plants grown under normal conditions of water supply. Water deficit and CCC treatments at budding stage delayed the flowering date about 2.6, and 1.6 days, respectively, than control. At the same time the date of first boll opening was earlier than control with about 3.3 days in case of drought, and 2.4 days with CCC treatment. Spraying cotton plants grown under drought conditions at budding with CCC gave a higher yield in comparison with the dry treatment

which was sprayed with water only. A slight reduction in lint percentage and average weight of 1000 seeds was observed in treatments sprayed with CCC. Fiber length was also affected by water deficit and CCC treatments. The lower value of fiber length was observed in the treatment with water deficit and sprayed with CCC.--Copyright 1974, Biological Abstracts, Inc.
W74-11650

SOME REGULATORY MECHANISMS OF COTTON ADAPTATION TO DROUGHT AND A SURPLUS WATER SUPPLY, (IN RUSSIAN),
Tashkent Agricultural Inst. (USSR).
A. R. Rakhimov.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 3, p 12-14, 1973.

Descriptors: *Cotton, Soil moisture, Drought.

Various species and types of cotton were used in a study of some regulatory mechanisms of adaptation to a drought and anaerobic conditions of the soil. Under the influence of drought, a disruption in the intensity and direction of physiolo-biochemical processes of metabolism occurs in the cotton. By means of regulatory mechanisms of adaptation, the vegetative cells adjust to self-regulation, which to some extent promote the return of the disrupted processes to normal.--Copyright 1974, Biological Abstracts, Inc.
W74-11700

2J. Erosion and Sedimentation

EXPERIENCES WITH PHOTOMETRIC TURBIDITY MEASUREMENTS,
Bayerischer Gewaesserkundedienst Staatlich, Munich, (West Germany).
For primary bibliographic entry see Field 7B.
W74-11540

A METHOD FOR MEASURING THE QUALITY OF BEDLOAD TRANSPORTED BY SHORT FLOOD WAVES,
Bulgarian Academy of Sciences, Sofia. Inst. of Water Problems.
For primary bibliographic entry see Field 7B.
W74-11541

STATISTICAL PARAMETERS OF DISTRIBUTION OF GRANULATION INDICATING SUSPENDED SEDIMENT AND BED SEDIMENT,
Technische Universitaet, Dresden (East Germany). Dept. of Hydrology and Meteorology.
N. Hansel.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 538-543, 1973. 1 fig, 1 tab, 4 ref.

Descriptors: *Particle size, *Statistical methods, *Bed load, *Suspended load, Sedimentology, Statistics, Sediment sorting, Data processing, Data collections, International hydrological decade.

Grain diameters must be based on proper statistics to characterize the distribution of granulation of sediments. Based on the typical form of the distribution of granulation, statistical parameters are presented, and their values for typical granulation mixtures are given. The distribution of grain number and grain surface can be derived from the usual distribution of granulation. The degree of fineness and the degree of uniformity are derived from Kneschke and Schoch's formula. (See also W74-11493) (Knapp-USGS)
W74-11542

BEDLOAD MEASUREMENT BY MEANS OF BOTTOM PLATES AND BEDLOAD SAMPLERS WITH HYDROPHONE ATTACHMENTS,
Bundesanstalt fuer Gewasserkunde, Coblenz (West Germany).
For primary bibliographic entry see Field 7B.
W74-11543

FIELD STUDIES OF SEDIMENT MOVEMENT USING FLUORESCENT TRACERS,
Geological Survey, Fort Collins, Colo.
C. F. Nordin, and R. E. Rathbun.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 552-561, 1973. 7 fig, 2 tab, 5 ref.

Descriptors: *Tracers, *Sediment transport, *Fluorescent dyes, Bed load, Sands, Sampling, Data collections, Sedimentology, Sedimentation, Tracking techniques, International hydrological decade.

Particles of various diameters and specific gravities, coated with fluorescent dyes, were used to study sediment movement in sand-channel streams of the south-western United States. Simple and inexpensive techniques were developed for coating and injecting particles and for obtaining and analysing samples. The steady-dilution or time-integration methods are recommended for high velocity, flat bed conditions, while the spatial-integration method is more suitable for dune bed conditions. The transport rate, calculated by the time-integration method for a flat bed, was about 14 per cent greater than the measured transport rate. Particle velocities for the flat bed depended on size and density, whereas for the dune bed, particle velocities approximated to the dune migration velocity and appeared to be only weakly dependent on density. (See also W74-11493) (Knapp-USGS)
W74-11544

RESERVOIR SEDIMENTATION,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6B.
W74-11610

USE OF RIVERS TO PREDICT ACCUMULATION IN SEDIMENT OF RADIO-NUCLIDES DISCHARGED FROM NUCLEAR POWER STATIONS,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
For primary bibliographic entry see Field 5B.
W74-11654

THE OCCURRENCE AND RETENTION OF RADIONUCLIDES IN THE SEDIMENTS OF WHITE OAK LAKE,
Oak Ridge National Laboratory, Tenn.
For primary bibliographic entry see Field 5B.
W74-11665

THEORETICAL EXPERIMENTAL AND FIELD STUDIES CONCERNING REACTIONS OF RADIOISOTOPES WITH SEDIMENTS AND SUSPENDED PARTICLES OF THE SEA. PART C: APPLICATIONS TO FIELD STUDIES,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco). Oceanographic Museum.
For primary bibliographic entry see Field 5B.
W74-11670

PROCEEDINGS: PLANNING AND DESIGN FOR URBAN RUNOFF AND SEDIMENT MANAGEMENT.
For primary bibliographic entry see Field 4D.
W74-11678

REPORT ON A NEW UNDERWAY SEDIMENT SAMPLER,
Woods Hole Oceanographic Institution, Mass.
J. P. Ellis.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-224 499, Price $3.50 printed copy; $2.25 microfiche. Report WHOI-73-35, June 1973. 23 p, 6 fig, 3 tab, 10 ref. Supported by Petroleo Brazileiro (S.A.).

Descriptors: *Sampling, *Bottom sediments, Ships, Surveys, Equipment, Oceanography, Sedimentology, Data collections, Sediments.

An underway sediment sampler was designed to obtain sediment samples without having to stop the survey vessel. Relatively inexperienced personnel can obtain adequate samples from a variety of bottom types and water depths in minimum amounts of station time and with minimum equipment loss. (Knapp-USGS)
W74-11726

SEDIMENT TRANSPORT DUE TO OSCILLATORY WAVES,
California Univ., Berkeley. Hydraulic Engineering Lab.
For primary bibliographic entry see Field 2L.
W74-11731

SEDIMENTS OF THE EAST ATLANTIC CONTINENTAL MARGIN--A PRELIMINARY REPORT,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 2L.
W74-11739

EROSION PROCESSES, FLUVIAL SEDIMENT TRANSPORT AND RESERVOIR SEDIMENTATION IN A PART OF THE NEWELL AND ZAYANTE CREEK BASINS, SANTA CRUZ COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
W. M. Brown, III.
Open-File report, August 3, 1973. 31 p, 14 fig, 4 tab, 19 ref.

Descriptors: *Sediment yield, *Reservoir silting, *Erosion, *Sedimentation, *California, Land use, Mass wasting, Road construction, Excavation, Landslides, Soil erosion, Vegetation effects.
Identifiers: Newell Creek basin(Calif), Zayante Creek basin(Calif).

Erosion and sedimentation were studied in the drainage basins upstream from Loch Lomond on Newell Creek and at a proposed reservoir site on Zayante Creek, California. The study area is underlain predominantly by sandstone, siltstone, and shale that decompose readily into moderately deep soils, friable colluvium, and easily transported sediments. Nearly all of the geologic units show a propensity for accelerated erosion accompanying the disturbance of the land surface by the road-building practices in the study area. At least 46 acre-feet of sediment accumulated in Loch Lomond in a 10-year period. Sediment yield was about 1,100 tons annually per square mile of drainage basin upstream from the reservoir arms where the major deposition occurred. This sediment occupied less than 1 percent of the original capacity of Loch Lomond, but the volume of measured sediment deposition is probably conservative. On Zayante Creek suspended-sediment yields were about 4,570 and 570 tons per square mile for the 1970 and 1971 water years. This probably reflects intensive roadbuilding practices in the central and upstream parts of the Zayante Creek drainage in the study area. (Knapp-USGS)
W74-11758

STREAMFLOW, SEDIMENT, AND TURBIDITY IN THE MAD RIVER BASIN, HUMBOLDT AND TRINITY COUNTIES, CALIFORNIA,
Geology Survey, Menlo Park, Calif.

For primary bibliographic entry see Field 2E.
W74-11770

CONCENTRATION OF HEAVY METALS IN SEDIMENT CORES FROM SELECTED WISCONSIN LAKES,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W74-11915

REMOTE SENSING STUDY OF LAND USE AND SEDIMENTATION IN THE ROSS BARNETT RESERVOIR, JACKSON, MISSISSIPPI, AREA,
University of Southern Mississippi, Hattiesburg.
For primary bibliographic entry see Field 4A.
W74-11963

THE EFFECT OF BOAT WAVES ON THE SEDIMENTARY PROCESSES OF A NEW ENGLAND TIDAL FLAT,
New Hampshire Univ., Durham. Dept. of Earth Sciences; and New Hampshire Univ., Durham. Jackson Estuarine Lab.
F. E. Anderson.
Available from NTIS, Springfield, Va 22161 as AD-774 902, Price $3.25 printed copy, $2.25 microfiche. Technical Report No 1, February 1, 1974. 38 p, 15 fig, 19 ref. ONR Contract No N00014-67-A-0158-0007.

Descriptors: *Estuaries, *Sedimentation, *Erosion, *Boating, *Waves(Water), *New Hampshire, Currents(Water), Sediment transport, Tides.
Identifiers: Boat waves, Boat wakes.

The effect of increased boat traffic on channel bank and tidal flat erosion was studied using a system of intake valves in a portion of a tidal flat in the Great Bay Estuary of New Hampshire. Waves were set up from six different boats, ranging in size from 13 to 34 feet. Water samples were collected from 8 stations spaced over the tidal flat. At each station, water samples at 30 and 15 cm off the bottom were collected before, during and after the boat wave passed by and were filtered for total suspended load. The boat wave characteristics were measured, along with the bottom currents, salinity, near bottom temperatures, and temperature profiles of the water column. Boat waves were set up at the beginning of the flood phase and near the end of the ebb. The boat waves can suspend 1/3 to 1/2 more sediments under the same wave conditions on the flood tide than on the ebb tide. During the flood tide the sediments were transported seaward in a tidal current gyre in the sampling area. Density underflows may form under severe wave activity and cause additional seaward transportation. (Knapp-USGS)
W74-11973

VARIATION IN BLUFF RECESSION IN RELATION TO LAKE LEVEL FLUCTUATIONS ALONG THE HIGH BLUFF ILLINOIS SHORE,
Lake Michigan Federation, Chicago, Ill.
C. E. Larsen.
Available from NTIS, Springfield, Va 22161 as PB-226 780, Price $3.75 printed copy; $2.25 microfiche. Illinois Institute for Environmental Quality Document No 73-14, September 25, 1973. 73 p, 16 fig, 6 tab, 26 ref.

Descriptors: *Erosion, *Beach erosion, *Lake Michigan, *Water level fluctuations, *Illinois, Surf, Waves(Water), Construction, Land use.

A theoretical method is given for approximating the accelerated erosion of the shoreline of a lake associated with high water levels. Given similar bluff height and composition, the retreat of the base of the bluff was expected to be in direct proportion to the water levels to which it is exposed. The high bluff portion of the Illinois shoreline of Lake Michigan is used to demonstrate this relationship. Definite variation from the influences of lake level fluctuation is evident. In each of three cases in which erosion differed from the expected amount, recession in proportion to lake level fluctuation occurred synchronously with the first documented construction activity along the shore. Construction was in the form of harbor structures, shore-sited buildings, and groins. (Knapp-USGS)
W74-11974

SUSPENDED-SEDIMENT LOAD OF TEXAS STREAMS, COMPILATION REPORT OCTOBER 1965-SEPTEMBER 1971,
Texas Water Development Board, Austin.
J. Mirabal.
Report 184, May 1974, 119 p, 1 fig.

Descriptors: *Sediment discharge, *Texas, *Data collections, *Suspended load, Sampling, Hydrologic data.

Suspended-sediment-load measurements made at permanent observation points in Texas from 1965 to 1971 are presented. During this period, the Texas Water Development Board operated 44 suspended-sediment sampling stations. A summary table shows maximum, minimum, and average annual suspended-sediment transport passing each gaging point for the total period. Sediment outflow records for four reservoirs in Texas were obtained. Records were taken at Possum Kingdom Reservoir, Brazos River basin; Somerville Lake, Brazos River basin; Lake Buchanan, Colorado River basin; and Lake Corpus Christi, Nueces River basin. (Knapp-USGS)
W74-11991

2K. Chemical Processes

THE MEASUREMENT OF MEAN TEMPERATURE ON A REACTION VELOCITY BASIS AND ITS APPLICATION TO HYDROLOGY,
Baden Wuerttemberg Hydrological Service, Karlsruhe (West Germany).
For primary bibliographic entry see Field 7B.
W74-11539

DEUTERIUM AND OXYGEN-18 MEASUREMENTS ON SURFACE WATERS OF THE BAVARIAN PREALPS,
Gesellschaft fuer Strahlenforschung m.b.H., Munich (West Germany). Institut fuer Radiohydrometrie.
H. Moser, W. Stichler, and P. Trimborn.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 615-626, 1973. 6 fig, 2 tab, 12 ref.

Descriptors: *Deuterium, *Oxygen isotopes, *Surface waters, *Water balance, Alpine, Mountains, Precipitation(Atmospheric), Snowmelt, Rivers, Lakes, Hydrology, Data collections, International hydrological decade.
Identifiers: *Germany(Bavarian Prealps).

The hydrogen isotope ratio and the oxygen isotope ratio were studied in brooks, rivers and lakes in the Bavarian Prealps. The results are discussed with regard to the origin of the water and its intermixture, as well as to special isotope fractionations during the flow time. Under certain conditions, isotope measurements can furnish quantitative hydrometric results for the evaluation of components of flow systems. A steady increase of the D content occurs along the watercourses. The waters with the lowest values were found in the source areas of the high mountains where most of the water is freshly fallen rain or snow. The lakes with a large surface area and longer residence times have a difference in D values between the inflow and outflow greater than for smaller lakes that are traversed more rapidly. Between November and June a shift occurs in the average D and 0-18 values towards the negative. This signifies that into early summer a large part of the streams are fed by snowmelt. (See also W74-11493) (Knapp-USGS)
W74-11550

TEMPERATURE MEASUREMENTS OF WATER SURFACES USING INFRA-RED RADIATION THERMOMETERS,
Deutscher Wetterdienst, Hohenpeissenberg (West Germany).
For primary bibliographic entry see Field 7B.
W74-11552

SURFACE PROPERTIES OF WATER,
Rochester Inst. of Tech., N.Y.
K. Hickman, I. White, W. V. Kayser, D. Thakur, and H. Palmer.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 708/AS; $4.00 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-936, March 1974. 81 p, 25 fig, 5 tab, 23 ref. OSW Contract 14-30-2964.

Descriptors: *Water structure, *Water properties, *Water temperature, *Distillation, *Water purification.
Identifiers: Water surface, Water instability, Schizoid liquid surface, Superheated water, Vapor recoil instability, Reservoir flow.

The study of motions on and beneath the surface of water slightly superheated at its boiling point has been continued. A new form of surface instability by 'onaclovs' has been discovered. The effects of small traces of long chain fatty acids on increasing superheat and decreasing thermal plunge lines have been measured. Measurements have been extended to lower pressures and temperatures. It was found that fatty acids exert greater surface effects at lower temperatures. Surface movements generated by differential vapor recoil have been recorded and published; a new mathematical analysis of vapor recoil has been completed. A distilling system for the production of extremely pure water has been assembled, tested, and maintained in operation for 12 months. The product water has a conductivity of 0.44-0.50 micromphos/cm and is thus within 75% of absolute ionic purity, e.g. 8-12 times purer than commercially available top quality distilled water. Biological tests, repeated over many months, showed that the water was free from living organisms, free from pyrogens, and unable to support growth of Pseudomonas aeroginosa. (OSW)
W74-11640

STUDIES OF OXYGEN REDUCTION AT A ROTATING DISK ELECTRODE,
California Univ., Berkeley.
For primary bibliographic entry see Field 3A.
W74-11641

SIMPLIFIED ATOMIC ABSORPTION DETERMINATION OF STABLE STRONTIUM IN MILK AND HAY: A COMPARISON OF METHODS AND STEPWISE PROCEDURE,
Environmental Protection Agency, Las Vegas, Nev. Monitoring Systems Research and Development Lab.
For primary bibliographic entry see Field 5A.
W74-11652

THE TRACE ANALYSIS OF WATER FOR SELECTED METALLIC ELEMENTS EMPLOYING SQUARE-WAVE POLAROGRAPHY,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11679

ATOMIC ABSORPTION DETERMINATION OF ELEMENTAL MERCURY COLLECTED FROM AMBIENT AIR ON SILVER WOOL,
Environmental Protection Agency, Research Triangle Park, N.C. Quality Assurance and Environmental Monitoring Lab.
For primary bibliographic entry see Field 5A.
W74-11705

CONSECUTIVE TITRATION OF CALCIUM AND MAGNESIUM IN ETHANOL-WATER MIXTURE,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
B. Wallen.
Analytical Chemistry, Vol 46, No 2, p 304-305, February, 1974. 1 fig, 1 tab, 11 ref.

Descriptors: *Calcium, *Magnesium, *Analytical techniques, *Volumetric analysis, Water, Mercury, Testing procedures, Laboratory tests, Aqueous solutions, *Pollutant identification.

The result of an analytical procedure normally carried out in water might be improved if performed in a mixed solvent. A method for the simultaneous determination of calcium and magnesium was presented as an example of what can be achieved by changing the medium. With a mercury indicator electrode, two potential breaks were obtained when a mixture of calcium and magnesium was titrated with ethylene glycol bis- (beta-aminoethylether)-N, N-titracetic acid (EGTA) at pH 10 in an aqueous medium containing 70-80% (v/v) ethanol or methanol. In water, only the break corresponding to the titration of calcium was observed. The magnesium end-point break was obtained, however, at the expense of the quality of the calcium endpoint break. To avoid that negative effect, calcium was titrated as usual in water at pH 8.5-9.0. When the end-point break for the calcium titration had been obtained, the titration was interrupted and alcohol added to make the solution 70-80% (v/v) with respect to this component. The pH was raised at the same time to about 10 and the titration continued until the magnesium end-point break was obtained. (Jernigan-Vanderbilt)
W74-11721

U.S. GEOLOGICAL SURVEY WATER QUALITY PROGRAM, INDIANA DISTRICT,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 5A.
W74-11734

MOLECULAR MECHANISMS OF CONDUCTION AND POLARIZATION IN WATER VAPOR, LIQUID WATER, AND ICE,
Massachusetts Inst. of Tech., Cambridge. Insulation Research Lab.
For primary bibliographic entry see Field 1B.
W74-11744

SIMULATION OF MAJOR INORGANIC CHEMICAL CONCENTRATIONS AND LOADS IN STREAMFLOW,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-11764

GEOCHEMICAL METHODS IN GEOTHERMAL EXPLORATION,
Iceland Univ., Reykajavik. Science Inst.
G. E. Sigvaldason.
In: Geothermal Energy--Review of Research and Development (Earth Sciences Series, No 12, p 49-59): United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France, 1973. 6 fig, 3 tab, 48 ref.

Descriptors: *Geothermal studies, *Geochemistry, *Surveys, *Exploration, Water chemistry, Brines, Chlorides, Thermal water, Hydrothermal studies, Thermal power, Reviews. Identifiers: *Geothermal energy.

In the past ten years geochemical methods have been applied increasingly in the planning and operation of geothermal developments. Geochemical methods are now widely used in preliminary prospecting for potential geothermal exploitation, and chemical data on natural discharge from thermal areas serve as an important guide for decision making on subsurface exploration by drilling. As drilling proceeds, chemical analysis of deep thermal fluids provides information on flow patterns of water and assists in selecting improved drilling sites. During production, testing, and subsequent utilization, chemistry provides an efficient and inexpensive tool to detect minor and major changes in the reservoir, both with regard to temperature and water level fluctuations. (Knapp-USGS)
W74-11786

PUBLIC GROUNDWATER SUPPLIES IN CRAWFORD COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11880

PUBLIC GROUNDWATER SUPPLIES IN BROWN COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11881

PUBLIC GROUNDWATER SUPPLIES IN BOONE COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11882

PUBLIC GROUNDWATER SUPPLIES IN FORD COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11883

PUBLIC GROUNDWATER SUPPLIES IN HARDIN COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11884

PUBLIC GROUNDWATER SUPPLIES IN KENDALL COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11885

PUBLIC GROUNDWATER SUPPLIES IN EDGAR COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11886

PUBLIC GROUNDWATER SUPPLIES IN ALEXANDER COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-11887

THE NORTH ATLANTIC OCEAN AS A SOURCE OF ATMOSPHERIC N2O,
Max-Planck-Institut fuer Chemie, Mainz (West Germany).
J. Hahn.
Tellus, Vol 26, No 1-2, p 160-168, February 1974. 3 fig, 2 tab, 25 ref.

Descriptors: *Surveys, *Basic data collection, *Oceans, Atlantic ocean, Field data, On-site data collections, Gases, Profiles.
Identifiers: *Nitrous oxide.

In 1969, 1970, and 1971 N2O measurements of sea water were carried out during three cruises in the open North Atlantic ocean. Water samples were taken from the sea's surface and from depths down to 3,000 m at several stations. Surface water concentrations in the tropical-subtropical latitudes averaged 0.5 micrograms N2O per liter sea water. For the range from 38.5N to 48.5N, an average of 0.4 micrograms N2O per liter sea water was found. In the area of the Iceland-Faroe ridge, the surface water concentrations averaged 0.4 micrograms N2O per liter sea water when water temperatures were 10C and 0.5 micrograms N2O per liter sea water when water temperatures were 5C. The vertical N2O concentration profiles often show two maxima: a smaller one between 100 and 200 m and a larger one between 400 and 1,000 m with N2O concentrations up to 0.8 micrograms per liter sea water. The North Atlantic sea water is supersaturated with N2O. For the upper sea water layers down to 1,000 m the following average values were obtained from vertical profiles: in tropical latitudes about 66 percent supersaturation, in subtropical latitudes about 47 percent, in the range from 38.5N to 48.5N about 42 percent, and in the area of the Iceland-Faroe ridge about 12-20 percent supersaturation. The North Atlantic ocean acts as a net source of atmospheric N2O. It is probable that the other oceans have the same ability. (Humphreys-ISWS)
W74-11900

CARBON MONOXIDE IN THE SOUTH PACIFIC OCEAN,
Navel Research Lab., Washington, D.C.
J. W. Swinnerton, and R. A. Lamontagne.
Tellus, Vol 26, No 1-2, p 136-142, 1974. 4 fig, 1 tab, 12 ref.

Descriptors: *Surveys, *Basic data collections, *Oceans, Pacific Ocean, Field data, On-site data collections, Gases, Profiles.
Identifiers: *Carbon monoxide.

During an oceanographic cruise of the U.S. Coast Guard icebreaker Glacier in November 1972, both surface sea water and atmospheric samples were collected for carbon monoxide (CO) analysis. The ship followed a cruise track from Long Beach, California to McMurdo Sound in the Antarctic. Atmospheric CO concentrations in the south Pacific were found to be much lower than those measured in the north Pacific, 0.04 ppm to 0.13 ppm, respectively. CO concentrations in sea water of the south Pacific range between 0.00001 and 0.0003 ml/l and compare favorably to levels measured in the oceans of the northern hemisphere. In all sea water samples, the CO was supersaturated relative to the surrounding atmosphere. Sea water CO concentrations were highest in regions of upwelling of water convergence zones. These areas were also associated with high biological activity. Ten vertical profiles of CO in sea water were obtained between Long Beach and McMurdo Sound. In general, the CO concentration was highest in the upper 30 m with a steady decrease to near 0 concentration at 100 m. On the Antarctic sea ice, the highest concentrations of CO were found on the bottom ice which had brown algae penetrating half a meter into the ice. The surface snow exhibited concentrations of CO which were comparable to those found in the surface sea water for the same area. (Humphreys-ISWS)
W74-11904

HYDROGEOLOGICAL MAPS OF KOREA, 2. UPPER JINWI RIVER BASIN, (IN KOREAN),
Korea Geological and Mineral Inst., Seoul.
For primary bibliographic entry see Field 7C.
W74-11908

SELECTIVE SEPARATION AND CONCENTRATION OF SILVER VIA PRECIPITATION CHROMATOGRAPHY,
Massachusetts Univ., Amherst. Dept. of Chemistry.

For primary bibliographic entry see Field 5A.
W74-11911

GRAPHITE BRAID ATOMIZER FOR ATOMIC ABSORPTION AND ATOMIC FLUORESCENCE SPECTROMETRY,
Michigan State Univ., East Lansing. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11912

SELECTED HYDROLOGIC DATA IN THE UPPER COLORADO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-11979

AMMONIUM ION SPECIFIC ELECTRODE,
Department of Health, Education, and Welfare, Bethesda, Md.
Available from NTIS, Springfield, Va 22161 as PB-220 884, Price $3.25 printed copy; $2.25 microfiche. Patent Application Report PH(G)-250-70, April 1973. 23 p, 6 fig, 1 tab.

Descriptors: *Ammonia, *Ions, *Analytical techniques, *Instrumentation, *Electrodes, Permselective membranes, Water chemistry, Water analysis, Equilibrium, Electrochemistry, Ureas, Enzymes, Pollutant identification.
Identifiers: *Ammonium ion electrodes.

An electrode specific for ammonium ion which is made by covering the surface of a monovalent cationic electrode with a membrane permeable to ammonia but impermeable to interfering cations such as sodium and potassium is described in a patent application. A thin layer of buffer-electrolyte is trapped between the surface of the electrode and the ammonia permeable membrane. The reference electrode is placed, via a small plastic tubing, in the buffer-electrolyte trap. When this electrode device is dipped into a solution containing ammonium ion of which there is equilibrium concentration of ammonia, ammonia gas (dissolved in the sample solution) passes through the gas-permeable membrane over the electrode to again produce ammonium ion. The ammonium ion is potentiometrically sensed by the active surface of the monovalent cationic electrode. (Knapp-USGS)
W74-11984

GROUNDWATER AND GEOLOGY OF BARAGA COUNTY, MICHIGAN,
Geological Survey, Lansing, Mich.
For primary bibliographic entry see Field 4B.
W74-11987

A NETWORK FOR CONTINUOUS MONITORING OF WATER QUALITY IN THE TRINITY RIVER BASIN, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 5B.
W74-11995

2L. Estuaries

EFFECTS OF SALT MARSH IMPOUNDMENTS ON MOSQUITO POPULATIONS,
North Carolina State Univ., Raleigh. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W74-11461

CHANNEL FRICTION AND SLOPE EFFECTS ON HARBOR RESONANCE,
State Univ. of New York, Buffalo. Dept. of Engineering Science.
For primary bibliographic entry see Field 8B.
W74-11480

OREGON'S ESTUARIES: DESCRIPTION AND INFORMATION SOURCES FOR OREGON'S ESTUARIES,
Oregon State Univ., Corvallis.
K. Percy, C. Sutterlin, D. Bella, and P. Klingeman.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 373, $6.50 in paper copy, $2.25 in microfiche. Sea Grant College Program, May 1974. 294 p, 27 fig, 170 tab, 155 ref. OWRR C-4108-ORE(No 9057)(1).

Descriptors: *Estuaries, *Oregon, Natural resources, Tides, Drainage basins, Salinity, Sediments, Water quality, Physical properties, Biological properties, Chemical properties, Discharge(Water), Mixing, Water utilization, Information exchange, Estuarine environment.

Information concerning the physical, chemical, and biological characteristics of Oregon's estuaries and of the natural resources found within them has not been available in complete form from any one agency, group or publication. Partial information can be obtained from many different sources if the planner or decision maker knows whom to ask and where to look. This report, while not a complete compilation of facts about the natural resources and related features of Oregon's estuaries, provides a summary of much of the known information about the estuaries and gives numerous citations of literature and agencies from which supporting information may be obtained. The report is intended to provide the planner with a 'starting point' for assembling the required data concerning most of the Oregon estuaries. (Buckley-Oregon)
W74-11575

ASPECTS OF THE DISTRIBUTION AND TRACE ELEMENT COMPOSITION OF SUSPENDED MATTER IN THE BLACK SEA,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-11709

MERCURY CONCENTRATIONS IN FISH, PLANKTON, AND WATER FROM THREE WESTERN ATLANTIC ESTUARIES,
Long Island Univ., Greenvale, N.Y. Graduate Dept. of Marine Science.
For primary bibliographic entry see Field 5A.
W74-11715

STUDIES OF THE INNER SHELF AND COASTAL SEDIMENTATION ENVIRONMENT OF THE BEAUFORT SEA FROM ERTS-1,
Geological Survey, Menlo Park, Calif.
E. Reimnitz, and P. W. Barnes.
Available from the National Technical Information Service, Springfield, Va 22161, as N73-21328, Price $3.00 printed copy; $2.25 microfiche. Progress Report for period January to March 1973, to Goddard Space Flight Center (1973). 6 p.

Descriptors: *Remote sensing, *Satellites(Artificial), *Erosion, *Ice cover, *Arctic, Sea ice, Ice breakup, Scour, Alaska, Bottom sediments, Aerial photography, Data collections.
Identifiers: Strudel scour, *Beaufort Sea.

Northward flowing rivers of Alaska inundate extensive areas of sea ice during spring breakup. This process was studied under the ERTS-1 program using satellite data. Drainage of large volumes of freshwater through the ice at holes and cracks (strudel) causes scour depressions over 4 m deep, and up to 20 m across in the sea floor below. These modern strudel scours and their filled counterparts were studied by side scan sonar, fathometer, high resolution seismic gear, diving observations, and by sediment sampling. Strudel scours occur within 30 km of river mouths, generally in areas where ERTS imagery shows less potential for drifting ice to scour the bottom than elsewhere. The shapes and distribution patterns of strudel scours correspond with those of strudel seen in the ice canopy. (Knapp-USGS)
W74-11728

SEDIMENT TRANSPORT DUE TO OSCILLATORY WAVES,
California Univ., Berkeley. Hydraulic Engineering Lab.
T. C. MacDonald.
Available from NTIS, Springfield, Va. 22161 as AD-773 463, Price $8.50 printed copy; $2.25 microfiche. Technical Report HEL-2-39, October 1973. 98 p, 28 fig, 3 tab, 22 ref, append. Army Engineers Contract DACW-72-71-C-0024.

Descriptors: *Sediment transport, *Beaches, *Surf, *Waves(Water), Bed load, Suspended load, Hydraulic models, Turbulence, Turbulent flow, Regime, Littoral drift.

A method is given for estimating the amount of sediment in suspension in an oscillating flow such as found near the ocean floor offshore of the breaker zone. The waves causing this suspension are assumed to be of small amplitude and relatively large length, permitting the linearization of the equations of motion and allowing a simpler experimental apparatus. Laboratory measurements of the velocity distribution in a flow simulating the fluid motion resulting from a linearized wave indicate that the practically constant and parallel oscillating flow existing near the ocean bed is reduced to zero velocity in a very thin layer just above the bed. Almost all the shear stresses near the ocean bed resulting from the oscillating flow are contained in this thin layer. In oscillating flow the turbulence intensity is less than in unidirectional flow because of the lower flow velocities; it decays to essentially zero long before the water surface is approached. Because the turbulence in oscillating flow is less, the effect of sediment settling velocity on the distribution of sediment exchange becomes significant and the momentum exchange coefficient no longer approximates the sediment exchange coefficient. By superimposing a small unidirectional flow, such as the mass transport or a coastal current, on oscillating flow, the total amount of sediment transport can be approximated. (Knapp-USGS)
W74-11731

SEDIMENTS OF THE EAST ATLANTIC CONTINENTAL MARGIN--A PRELIMINARY REPORT,
Woods Hole Oceanographic Institution, Mass.
J. D. Milliman.
Technical Report Reference No 72-2, January 1972. 18 p, 10 fig, 4 ref. NFS Grant GX-28193.

Descriptors: *Sedimentation, *Provenance, *Coastal plains, *Continental shelf, *Africa, Mineralogy, Mud, Sands, Silts, Carbonates, Organic matter, Weathering, Deserts, Tropical regions.

The petrology, provenance and history of surficial sediments on the continental margin of Africa were studied using approximately 1000 samples obtained from collections. All sediment studies have been limited to depths less than 500 meters--that is the continental shelf and the upper slope. Three broad depositional areas can be recognized: Gibraltar to Cape Verde, Cape Verde to Liberia, and Liberia to the Niger. Sediments on the shelf and upper slope from Gibraltar to Cape Verde are rich in carbonate, primarily because of the small amount of fluvial sedimentation. The carbonate assemblages are temperate to subtropical. Absence of chemical weathering in this arid climate results in the retention of large amounts of feldspar. South of Cape Verde the sediments become increasingly terrigenous as fluvial sedimentation increases. The carbonate assemblages are subtropical to tropical. The tropical rivers in this area drain chemically-weathered terrain. The

result is a dominance of quartz-rich sediments. Shelf sediments to the south and east of Liberia are dominated by fluvial muds. Many rivers in this area are short and drain coastal hills and mountains that are composed of crystalline rocks. As a result, the sediments tend to be more felspathic than normally would be expected in such a tropical area. Organic content in these sediments is high, probably the result of coastal upwelling as well as the deposition of river-borne plant material. (Knapp-USGS)
W74-11739

A MODEL OF CIRCULATION AND DISPERSION IN PEARL HARBOR,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
For primary bibliographic entry see Field 5B.
W74-11769

A TECHNIQUE FOR INTERPRETATION OF MULTISPECTRAL REMOTE SENSOR DATA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 7C.
W74-11773

RADIATION AND SCATTERING OF WATER WAVES BY RIGID BODIES: PART 2. VERTICAL CYLINDERS OF CIRCULAR CROSS-SECTION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11787

POPULATION, RESOURCES, AND POLLUTION, AND THEIR IMPACT ON THE HUDSON ESTUARY,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-11870

SEDIMENT AND WASTE DEPOSITION IN NEW YORK HARBOR,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W74-11874

EASTERN INTENSIFICATION OF OCEAN SPIN-DOWN: APPLICATION TO EL NINO,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 2E.
W74-11894

LONGSHORE CURRENTS AND THE ONSET OF UPWELLING OVER BOTTOM SLOPE,
Chicago Univ., Ill. Dept. of Geophysical Sciences.
J. Pedlosky.
Journal of Physical Oceanography, Vol 4, No 3, p 310-320, July 1974. 9 fig, 6 ref. NSF Grant GA-28427.

Descriptors: *Upwelling, *Currents(Water), *Mathematical models, *Oceans, Oceanography, Ocean currents, Topography, Coasts, Shores, Velocity, Profiles, Slopes, Stratification, Littoral, Momentum equation, Mathematics, Analytical techniques, Boundary layers.
Identifiers: *Longshore currents, Bottom slope.

The evolution of longshore currents produced by upwelling over shelf-like bottom topography for times long compared to a barotropic spin-up time, but short compared to a diffusion time, revealed in a linear, time-dependent, three-dimensional model that: (1) The topographic constraints yield a steady topographic boundary layer on these short time scales similar in structure to the layer found in an earlier steady-state model. (2) Within a Rossby radius of deformation of the coast a swift equatorward longshore current with a poleward countercurrent is formed. (3) Wind-stress forcing with large north-south scales are the most efficient in driving longshore currents, but do not effectively produce internal Kelvin waves, as do the shorter longshore scales of forcing. (Humphreys-ISWS)
W74-11896

DO-SAG IN OSCILLATING FLOW,
Syracuse Univ., N.Y. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-11897

RAPID COASTAL BOTTOM WATER TEMPERATURE RISES,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
P. D. Higley, and D. O. Cook.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE4, Proceedings Paper 10734, p 955-961, August 1974. 4 fig, 2 ref, append.

Descriptors: *Thermocline, *Massachusetts, *Bays, *Coastal engineering, Oceans, Temperature, Turnovers, Oceanography, Tidal waters, Coasts, Harbors, Hydrography, Surveys, Cooling, Environmental engineering, Water pollution, Water circulation, Meteorology, Ocean currents, Winds, Heated water, Aquatic environment, Waste disposal.
Identifiers: *Nahant Bay(Massachusetts), Bottom water temperatures, Rapid variations.

Rapid 5F to 15F (2.8C to 8.3C) increases of normally stable water temperature at depths of 63 ft to 76 ft (19 m. to 23 m.) in Nahant Bay, Massachusetts were observed during summer in 1972. These rises, which occurred in a few hours and persisted for several days, were apparently caused by temporary replacement of preexisting cooler bottom water by warm surface water which was transported into the bay by northeast winds. Weather records indicate that these events occur in Nahant Bay an average of three times per year between June and September when vertical temperature gradients occur. These rapid bottom water temperature rises are significant from an engineering standpoint because of potential deleterious effects on heated effluent diffusion and on efficiency of circulating water cooling systems. They also represent a natural means by which marine organisms are exposed to thermal stress. (Humphreys-ISWS)
W74-11901

MASS STRANDING OF MOLLUSCS AT TE WAEWAE BAY, SOUTHLAND, NEW ZEALAND,
Ministry of Agriculture and Fisheries, Wellington (New Zealand). Fisheries Research Div.
For primary bibliographic entry see Field 5C.
W74-11938

THE EFFECT OF BOAT WAVES ON THE SEDIMENTARY PROCESSES OF A NEW ENGLAND TIDAL FLAT,
New Hampshire Univ., Durham. Dept. of Earth Sciences; and New Hampshire Univ., Durham. Jackson Estuarine Lab.
For primary bibliographic entry see Field 2J.
W74-11973

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

COMPARISON STUDY OF A 2.5 MGD VERTICAL TUBE EVAPORATOR UPFLOW VERSUS DOWNFLOW,
Fluor Corp. Ltd., Los Angeles, Calif.
M. Marwede, and P. J. Schroeder.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 366/AS, $10.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-942, May 1974. 82 p, 2 ref. OSW Contract 14-30-2703.

Descriptors: *Design, Evaluations, Investment, *Evaporators, *Cost estimates, *Desalination plants, *Water costs.
Identifiers: Cost breakdowns, Falling film evaporation, Rising film evaporation, *Vertical tube evaporators.

The conceptual design and costs of a 2.5 mgd vertical tube saltwater evaporator with upflow in the vertical tubes were determined and compared to a previous downflow plant. The upflow plant was made identical to the downflow plant except where differences were necessary to carry out the upflow scheme. The areas where the plants differ were studied in more detail. The principal difference between the plants is that the upflow plant does not require effect pumps but does require slightly more area. Capital cost for a 2.5 mgd plant is about 6% lower for the upflow plant. A cost curve shows that this advantage improves as size increases to 10 mgd. Water cost is lowered from $1.13 to $1.08 per 1,000 gal. because of lower capital charges and lower electrical costs. Potential improvements in the upflow process are recommended. (OSW)
W74-11628

EVALUATION OF 75,000 GPD CONTINUOUS ION EXCHANGE SEA WATER DESULFATING PILOT PLANT,
Mason-Rust, Lexington, Ky.
K. M. Garrison, and J. E. Gugeler.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 697/AS, $13.00 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-964, January 1971. 185 p, 39 fig, 10 tab, 14 ref. OSW Contract 14-01-0001-2178.

Descriptors: *Ion exchange, Operations, *Pilot plants, *Desalination plants, Scaling, Sea water, *North Carolina.
Identifiers: *Desulfating, Operating experiences, *Wrightsville Beach Test Facility(NC).

The operational program of a 75,000 GPD Continuous Ion Exchange Desulfating Pilot Plant located at the Office of Saline Water Wrightsville Beach Test Facility is evaluated for the period July 1969 through November 1970. The Pilot Plant operation included checkout, start-up, operation for gathering of performance data, and operation to furnish feedwater to a Multi-Stage Flash Distillation Pilot Plant. Production of desulfated sea water for use as feedwater permitted Multi-Stage Flash Distillation Plant operation at 350F and a Concentration Ratio of 3.5. This operation was achieved for periods up to 336 hours with no deposition of scale or sludge on the heat exchange surfaces. (OSW)
W74-11629

CONCEPTUAL DESIGN AND COST ESTIMATE OF A VAPOR COMPRESSION VTE/MSF DESALTING PLANT,
Fluor Corp. Ltd., Los Angeles, Calif.

W. A. Bruinsma, M. E. Marwede, and P. J. Schroeder.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 698/AS, $16.00 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-962, December 1971. 237 p. OSW Contract 14-30-2956.

Descriptors: *Desalination plants, *Flash distillation, Costs, Estimated costs, Capital costs, Operating costs, *Vapor compression distillation, Turbines, Steam turbines.
Identifiers: Cost breakdowns, Gas turbines.

A conceptual design and cost estimate for an 8 MGD prototype gas turbine powered vapor compression VTE/MSF desalting plant were prepared. The process consists of a 34 effect MSF, a 4 effect VTE, and a 593,200 lb/hr vapor compressor powered by a commercial gas turbine exhausting through a heat recovery boiler. Total capital cost is estimated at $11,840,000, including the desalting plant and sea water intake. Water cost is estimated at $0.59 per 1,000 gallons, assuming a fuel cost of $0.30 per million Btu. (OSW)
W74-11630

OPERATION OF THE 16-STAGE MSF PILOT PLANT--1969-1970,
Envirogenics Co., El Monte, Calif.
R. N. Webb, G. G. Weth, and C. B. Schutt.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 699/AS; $11.50 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-966, April 1972. 150 p, 9 ref, 2 append. OSW Contract 14-01-0001-2240.

Descriptors: *Desalination plants, *Pilot plants, *Flash distillation, *Scaling, *Heat transfer.
Identifiers: Deionized feed, pH control, Alkalinity reduction, Feedwater treatment.

Operation of the 16-stage MSF pilot plant from July 1969 through December 1970 is discussed. Results are included for tests using desulfated feed, deionized feed, reduced alkalinity, pH control, CO2 scale suppression pilot plant, a plastic film heat exchanger, three brine heaters, cleaning outside of condenser tubes, and the fouling indicator. Highlights include a 350F, 3.5CF, scale-free test with desulfated feed. (OSW)
W74-11631

EVALUATION OF THE CAPABILITIES OF THE VERTICAL TUBE EVAPORATOR AND THE MULTISTAGE FLASH DISTILLATION DESALINATION PROCESSES.
Fluor Corp. Ltd., Los Angeles, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 713/AS; $18.00 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-960, September 1969. 226 p. OSW Contract 14-01-0001-1830.

Descriptors: Thermodynamics, *Flash distillation, Evaluation, *Desalination plants, *Design criteria, Performance, Operation, *Design data.
Identifiers: Vertical tube evaporators, Double fluted tubes, Enhanced surface tubes.

An evaluation is made on both large and small plants of the vertical tube evaporator and the multistage flash distillation desalination processes. For the large plant comparison, the Office of Saline Water furnished conceptual designs of 250 million gallon per day (MGD) plants prepared by Oak Ridge National Laboratory (ORNL), in which the VTE plant used double-fluted vertical tubes. For the small plant comparison, A-E designs on three 2.5 MGD plants were provided. Two of these were VTE plants furnished in two alternate designs made by the Stearns-Roger Corporation--one using smooth tubes, and the other using enhanced-surface tubes (double-fluted falling-film, and corrugated water-filed tubes). The MSF plant provided for comparison was the 2.5 MGD Universal Plant designed by Burns and Roe, Inc., for the OSW. These designs were reviewed and altered where necessary to make the process and engineering design bases the same for each plant. (OSW)
W74-11632

FOURTH REPORT ON HORIZONTAL-TUBE MULTIPLE-EFFECT (HTME) PROCESS PILOT PLANT TEST PROGRAM,
Universal Desalting Corp., New York.
C. J. Cannizzaro, J. Z. Karpf, N. Kosowski, and A. S. Pascale.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 715/AS; $10.50 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-967, July 1972. 121 p, 24 fig, 10 ref, 3 append. OSW Contract 14-01-0001-2247.

Descriptors: *Desalination plants, *Pilot plants, *Heat transfer, Design criteria, *Evaporators, Distillation, *North Carolina, Testing, Design data.
Identifiers: Brine distribution, Chemical cleaning, Pressure drop, *Wrightsville Beach Test Facility(NC), Horizontal tube evaporators.

Results of testing of the three-effect HTME Pilot Plant at the Wrightsville Beach Test Facility are reported for the period from May 1971 to January 1972. During this period, additional heat transfer data were obtained. Boiling coefficient on the outside of tubes and condensing coefficient inside of tubes were determined. A correlation was developed for the condensing coefficients. Photographic studies were made to determine the nature of bubble formation and growth on the outside surface of tubes. The variation of heat transfer coefficients across an HTME tube bundle was measured. Increased heat transfer coefficients, obtained at temperatures above 190F, are reported for tubes enhanced on the outside surface. Tests were conducted to determine the effectiveness of the brine distribution system to obtain uniform distribution of brine over the tube bundle, and results are reported comparing the brine distribution above and below a deep tube bundle. (OSW)
W74-11633

FIFTH REPORT ON HORIZONTAL-TUBE MULTIPLE EFFECT (HTME) PROCESS PILOT PLANT TEST PROGRAM,
Universal Desalting Corp., New York.
J. Z. Karpf, and R. S. Pascale.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 720/AS; $9.00 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-963, December, 1972. 91 p, 31 fig, 5 tab, 4 ref. OSW Contract 14-01-0001-2247.

Descriptors: Scaling, *Heat transfer, *Evaporators, *Design criteria, *Pilot plants, *Desalination plants, *North Carolina, Operation, Performance.
Identifiers: Bundle cleaning, Bundle design, Horizontal tube evaporators, *Wrightsville Beach Test Facility(NC).

Development work on the three-effect HTME evaporator at Wrightsville Beach was continued with studies in several areas of design and operation: comparative heat transfer performance of square-, rectangular-, and triangular-pitch tube bundles, influence of steam inlet passage geometry on local heat transfer performance within the bundle, bundle flooding, and feed distribution within a bundle, performance of an HTME evaporator during alkaline and anhydrite scaling, alkaline scale control, and methods of scale removal. (OSW)
W74-11634

DEVELOPMENT PROGRAM AND TEST INSTRUMENTATION FOR VTE/MSF MODULE PLANT, FOUNTAIN VALLEY, CALIFORNIA.
Envirogenics Co., El Monte, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 761/AS; $9.50 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-965, October 1971. 103 p. OSW Contract 14-30-2788.

Descriptors: *Desalination plants, *Flash distillation, *Instrumentation, *California, *Evaporators, Testing.
Identifiers: Modular construction, Prototype, Component test instruments, *Orange County(CA), Vertical tube evaporators.

The Office of Saline Water and the Orange County Water District have undertaken the construction and operation of a prototype VTE/MSF plant at Fountain Valley, California, with an ultimate capacity of 12.5 MGD. The initial plant will be modular in nature and will consist of 4 vertical tube effects and a 5 flash stage feed heater, with a capacity of 3.0 MGD. The 4-effect VTE/MSF module components are already sized for 12.5 MGD capacity and the expansion will consist basically of an increase in evaporator and feed heater length. The program presented in this report is projected to be accomplished during the first year of operation and consists of 16 tasks which are described in detail. (OSW)
W74-11635

DESALINATION MEMBRANES FROM BUILT-UP MULTILAYER FILMS,
Case Western Reserve Univ., Cleveland, Ohio.
T. Fort, Jr., and J. Lando.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 364; $5.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-944, April 1974. 47 p, 11 fig, 6 tab, 18 ref. OSW Contract 14-30-2913.

Descriptors: *Monomolecular films, *Thin films, *Membranes, Interfaces, *Reverse osmosis, Permselective membranes, Semipermeable membranes, Films, Separation techniques, Pressure, *Desalination, Isotherms.
Identifiers: Multilayers, *Ultrathin films, Microporous supports, *Multilayer apparatus, Vinyl stearate membranes, Pressure-area isotherms, Cellulose acetate membranes.

The feasibility of using composite membranes of Blodgett multilayers on porous backing materials has been investigated. Emphasis has been placed primarily on studying the effects of membrane preparation, thickness, and chemical composition on the product water flux and salt rejection. It is shown that multilayers from vinyl stearate and 2-octadecylacrylic acid can be built and polymerized on porous polysulfone films. The limited salt rejection of these substances is due primarily to the chemistry of the substances along with leakage through defects in the multilayers. Similar results were obtained with multilayers built directly from polyvinylstearate monolayers. Recent work has been concentrated on building multilayer membranes of cellulose acetate. A technique has now developed resulting in membranes showing 91.9% salt rejection at a flux rate of 12.5 gfd at 600 psi and a salt rejection of 89% at a flux rate of 16.8 gfd at 800 psi. (OSW)
W74-11636

CONCEPTUAL DESIGN AND COST ESTIMATE 2.5 MGD DIRECT CONTACT CONDENSATION MULTISTAGE FLASH DESALINATION PLANT,
Fluor Corp. Ltd., Los Angeles, Calif.
Schroeder Marwede.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232

762/AS; $8.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-961, January 1972. 78 p, 4 fig, 12 ref. OSW Contract 14-01-0001-1286.

Descriptors: *Design, Resins, *Heat exchangers, *Flash distillation, *Desalination plants, Plastics, *Cost estimates, Condensation.
Identifiers: Cost breakdowns, Water cost estimates.

The conceptual design and costs of a 2.5 MGD Direct Contact Condensation Multistage Flash Desalination Plant (DCC-MSF) were determined. The process is competitive with other processes such as VTE upflow or VTE downflow plants. Product water was estimated to cost $0.86 per 1000 gallons. Further testing of plant components is recommended. (OSW)
W74-11637

ANALYSIS OF EXISTING DATA FROM THE SAN DIEGO TEST FACILITY, PHASE II FINAL REPORT,
Houston Research Inst., Inc., Tex.
A. E. Dukler, and L. K. Schuster.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 357/AS; $8.00 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-940, May 1974. 96 p, 38 fig, 12 tab, 8 ref, 2 append. OSW Contract 14-30-2805.

Descriptors: *Desalination plants, Testing, *Flash distillation, Operation, *California, Maintenance, Pilot plants, Powerplants, *Performance.
Identifiers: Data banks, Modules, *San Diego(CA), Parametric studies.

Flash stage performance data from the 2.5 MGD MSF module and the 1.0 MGD Clair Engle Test Plant are compared with similar measurements and correlations evolved from 3-stage test units. Equilibrium data from the module, Clair Engle Plant, and the AMF and BLH pilot units have been brought together in convenient data bank format. (OSW)
W74-11638

AN INVESTIGATION OF THE VARIABLES AFFECTING STEAM CONDENSATION ON THE OUTSIDE OF A HORIZONTAL TUBE BUNDLE,
Oak Ridge National Lab., Tenn.
D. M. Eissenberg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 365/AS; $11.50 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-943, May 1974. 152 p, 31 fig, 7 tab, 34 ref, 4 append. OSW Contract 14-30-2535.

Descriptors: *Heat transfer, *Distillation, *Condensers, *Desalination apparatus, Tubes.
Identifiers: Multitube, Steam velocity, Thermal performance, *Steam condensers.

The accurate prediction of the thermal performance of large multitube steam condensers for application to the distillation desalination of sea water depends on the availability of correlations for calculating each of the film heat transfer coefficients for individual tubes located within the condenser as a function of local conditions. Although correlations are available, there have been few experimental verifications of their accuracy or even of their validity in the specific application to desalination, particularly with respect to the two film coefficients associated with the condensation process, the condensate film heat transfer coefficient and the non-condensable gas film heat transfer coefficient. A horizontal multitube steam condenser was built and operated in order to investigate the individual and combined effects of steam temperature, steam velocity, condensate rain, and non-condensable gas fraction on the thermal performance of a vertical array of five tubes located within the condenser over the range of interest of each of the variables of importance to the distillation desalination process. (OSW)
W74-11639

SURFACE PROPERTIES OF WATER,
Rochester Inst. of Tech., N.Y.
For primary bibliographic entry see Field 2K.
W74-11640

STUDIES OF OXYGEN REDUCTION AT A ROTATING DISK ELECTRODE,
California Univ., Berkeley.
M. Forbes, and S. Lynn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 727/AS; $5.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-935, March 1974. 185 p, 15 tab, 41 fig, 60 ref, 2 append. OSW Grant 14-01-0001-1461.

Descriptors: *Desalination, *Electrodes, *Electrochemistry, *Ion transport, *Oxidation, *Reduction(Chemical), *Kinetics.
Identifiers: *Rotating disk electrode, Platinum electrodes, Silver electrodes, Gold electrodes, Rate constants, Winkler oxygen analyses.

The kinetics and mechanism of oxygen reduction at platinum were investigated by means of a rotating disk electrode. A kinetic expression for the current for oxygen reduction was developed, taking into account both direct 4-electron reduction of OH- or H2O, and electrochemical reduction via hydrogen peroxide. Possible catalytic decomposition of hydrogen peroxide and loss of H2O2 by diffusion were considered. This expression was used to demonstrate that, in impure neutral saline solutions, oxygen reduction generally proceeds via the peroxide intermediate. The mechanism of activation and deactivation of a platinum surface with respect to oxygen reduction was investigated. Under the experimental conditions, the surface was deactivated by a mixed process of poisoning and desorption of a catalytic layer which had been formed during anodic activation. A miniature version of the Winkler oxygen analysis was developed. This technique permitted an accuracy of +1% when measuring oxygen concentrations of 6-7 ppm. An accuracy of +5% was sometimes obtained at the 0.1 ppm level, but there was a tendency for larger errors to occur because of shortcomings in the sampling procedure. (OSW)
W74-11641

RESEARCH ON ADVANCED MEMBRANES FOR REVERSE OSMOSIS,
Envirogenics Systems Co., El Monte, Calif.
A. F. Graef, W. J. Schell, C. W. Saltonstall, Jr., V. T. Stannett, and H. B. Hopfenberg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 690/AS; $6.25 in paper copy, $2.25 in microfiche. Office of Saline Water Report INT-OSW-RDPR-74-932, March 1974. 52 p, 18 fig, 10 tab, 11 ref. OSW Contract 14-30-2999.

Descriptors: *Reverse osmosis, *Membranes, *Desalination, *Permselective membranes, Semipermeable membranes, Osmosis, Permeability, Thin films, Pressure, Saline water, Sea water, Waste water treatment.
Identifiers: Sulfonated polysulfone, Asymmetric membranes, *Composite membranes, Polyoxetanes, Dense films, Viscosity of sulfonated polysulfone, Swelling agents, Salt rejection, Flux.

This report is concerned with the development of sulfonated polysulfone membranes for the single pass desalting of seawater, and with the potential of such membranes for the reverse-osmosis treatment of other chemically-contaminated waters. Included are results on the synthesis of sulfonated polysulfone, and on the pareparation and testing of dense films and asymmetric membranes derived from the sulfonated polymer. Dense film studies have shown that the various salt forms of sulfonated polysulfone offer excellent flux and salt rejection characteristics, especially when compared to cellulose acetate. The best reverse-osmosis test results to date were obtained with a membrane prepared from a casting solution containing the sodium form of the polymer (ds - 0.42), dioxane, acetone, maleic acid, and water. The solution was cast on silicone-coated paper, gelled in water at 1C, and the membrane was subsequently heat-treated for 5 min at 80C in 50% aqueous sodium nitrate. When tested at 600 psi with 0.3% sodium chloride this membrane exhibited a flux of 9.5 gfd with a salt rejection of 99.4%. Under simulated sea water conditions the flux was 9.8 gfd at a rejection of 96.0%. The observed decrease in rejection is believed to be caused by the presence of voids (about 1,250/cm2 in this particular membrane); and as a result current work is largely concerned with modifications in formulation and in casting conditions for the production of void-free membranes. The modification of polysulfone and other polymeric materials through the radiation grafting of unsaturated monomers, such as 2-vinyl pyridine, also is discussed. (OSW)
W74-11642

DEVELOPMENT OF SEA WATER MEMBRANES, PART I,
Du Pont de Nemours (E.I.) and Co., Wilmington, Del.
N. W. Rosenblatt, J. P. Agrawal, R. A. Halling, and R. C. Rollings.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 760/AS; $5.50 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-933, March 1974. 175 p, 50 tab, 43 fig, 19 ref, 4 append. OSW Contract 14-30-2739.

Descriptors: *Desalination, *Reverse osmosis, *Membranes, *Permeability, *Sea water, Pretreatment(Water), *Chelation.
Identifiers: Aromatic polyamides, Fouling control, Transition metals, Two-stage membranes, Salt rejection, Crosslinking.

Development work with the single-stage DP-1 polyamide-hydrazide sea water membrane is described. Reverse osmosis testing with synthetic and with natural sea water was carried out with cells and with tubular configurations. The membrane showed in cells carried out with cells and with tubular configurations. The membrane showed in cells an initial flux of 10-12 gal/sq. ft. X day and a chloride rejection of 99% and better at 1000 psi, 3.5% TDS and 25C. A perforated tube assembly capable of sea water desalination in one-pass was developed. Sustained capacity to recover potable water was demonstrated with tubes and with cells in the lab and in the field. A candidate for the first stage of a two-pass RO process exceeded goal performance. It was developed from the DP-1 polymer by modifying the casting composition and chelating the amidehydrazide with copper. Field and lab tests with cells showed that these higher flux membranes fouled more rapidly than one-pass membranes. Control measures were not as effective as with single-stage membranes. (See also W74-11644) (OSW)
W74-11643

DEVELOPMENT OF SEA WATER MEMBRANES, PART II,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del.
N. W. Rosenblatt, J. P. Agrawal, R. A. Halling, and R. C. Rollings.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-230 707/AS; $5.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-934, March 1974. 209 p, 38 tab, 38 fig, 27 ref, 3 append. OSW Contract 14-30-2739.

Descriptors: *Desalination, *Reverse osmosis, *Membranes, *Pretreatment(Water), *Fouling, *Sea water, Capital costs, Operating costs, Systems analysis.
Identifiers: Aromatic polyamides, Polyamide-hydrazide, Spiral modules, Annular cells.

Sea water pretreatment consisting of alum coagulation and filtration with sand and diatomaceous earth filters produced water of high clarity. Chlorination coupled with carbon treatment to remove excess chlorine provided effective disinfection at Ocean City until the carbon beds become contaminated with bacteria. This pretreatment has reduced flux decline in tubular RO devices. Potable water was produced consistently at Ocean City for one year with a sea of annular cells having a membrane area of one square foot. These results confirmed earlier conclusions that compact RO film devices can be used to desalt seawater in one-pass. Several small spiral elements wound with DP-1 membranes showed in the lab 99% rejection at 1000 psi, but flux was significantly lower than in cell tests. A continuous process was developed for casting DP-1 membranes of 12 inch width for spiral elements. These membranes frequently achieved single-stage performance after post-treatment. Capital and operating costs for sea water treatment and for one and two-pass desalination were developed along with necessary supporting information. (See also W74-11643) (OSW)
W74-11644

ANNUAL REPORT - VERTICAL TUBE EVAPORATOR MULTISTAGE FLASH TEST BED PLANT, FREEPORT, TEXAS, MARCH 19, 1971 TO MARCH 31, 1972.
Bechtel Corp., San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 316, $20.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-976, 1974. 340 p. OSW Contract 14-30-2748.

Descriptors: *Evaporators, *Flash distillation, Heat transfer, Operations, Scaling, *Desalination plants, *Performance, *Testing, Design.
Identifiers: Distributor nozzles.

Management, operation, and maintenance are described of the Vertical Tube Evaporator/Multistage Flash (VTE/MSF) Test Bed Plant at Freeport, Texas by the Bechtel Corporation during the period March 19, 1971 to March 30, 1972. Performance testing has revealed that overall heat transfer coefficients exceed design values. Plant operational stability has been excellent. (OSW)
W74-11807

SUMMARY OF DESALINATION PLANT BRINE DISPOSAL METHODS FOR INLAND LOCATIONS, FINAL REPORT, FEBRUARY 1971.
Fluor Corp. Ltd., Los Angeles, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 151/AS, $11.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-978, February 1971. 159 p, 38 fig, 28 tab. OSW Contract 14-01-0001-1286.

Descriptors: *Desalination plants, *Brackish water, *Waste disposal, Economics, Costs, *Brine disposal, Solar stills, *Flash distillation.
Identifiers: Effluent disposal, Seeding techniques, Salt crystallization.

The objective was to determine what process or combination of processes have most potential for economic concentration of desalting plant effluent to solids. The scope is limited to effluent from multi-stage flash (MSF) plants that had as feed water types 4, 5, 9, and 10 waters, being representative of nearly 70 percent of inland brackish waters. Two different processes are recommended depending on boiling point elevation characteristics. No one process is best for all water types. Effluent treating costs range from 19-46 cents/1000 gallons. (OSW)
W74-11808

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-15.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11809

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-14.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11810

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-13.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11811

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-12.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11812

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-11.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11813

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-10.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11814

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-9.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11815

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-8.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11816

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-7.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11817

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-6.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11818

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-5.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11819

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-4.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11820

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-3.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11821

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-2.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11822

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-1.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 474/AS; $3.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-945, December 1968. 32 p. OSW-AEC Agreement 14-01-0001-534, Work Order No 22.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials, *Flash distillation.

Abstracts are given for 50 reports issued by the Office of Saline Water relating to the corrosion and performance of materials of construction used in saline water conversion processes. The body of the report is a copy of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) at the Oak Ridge National Laboratory. The abstracts contained in the report are grouped in 14 categories and repeated on occasion if they fall into more than one category. The publication also contains a review of a recently issued report of a survey of materials behavior in multi-stage flash distillation plants. An author index and a keyword index to the reports referenced are given. The keywords, used to identify the content of the reports, have been selected from a thesaurus developed by OSW-MIC. (OSW)
W74-11823

FINAL REPORT STUDY OF THE APPLICATION OF ALUMINUM AS A PRINCIPAL MATERIAL OF CONSTRUCTION IN A 50 MGD MULTISTAGE FLASH DISTILLATION SYSTEM.
Foster Wheeler Corp., Livingston, N.J.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 047/AS; $9.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-941, May 1974. 94 p, 28 ref. OSW Contract 14-01-0001-1144.

Descriptors: *Design, Condensers, *Aluminum, Heat exchangers, Fabrication, *Desalination plants, *Flash distillation, *Construction materials.

An engineering study is presented for the application of aluminum as a principal material of construction in a 50 MGD multistage flash distillation system. In such a design it may not be feasible to make certain parts such as demisters and orifices of aluminum. In such cases compatible materials shall be used. (OSW)
W74-11824

RESEARCH AND DEVELOPMENT OF COMPOSITE MEMBRANE TECHNOLOGY,
General Atomic Co., San Diego, Calif.
R. L. Riley, C. R. Lyons, G. R. Hightower, M. Tagami, and F. K. Lesan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 043/AS; $8.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-948, May 1974. 106 p, 80 fig, 5 tab, 7 ref. OSW Contract 14-30-3016.

Descriptors: *Desalination, *Reverse osmosis, *Membranes, Sea water, *Semipermeable membranes, Membrane processes, Pressure, Thin films, Permselective membranes, Films, Permeability, Separation techniques.
Identifiers: *Composite membranes, Ultrathin membranes, Microporous support, Spiral wound modules, Single stage sea water desalination, Polysulfone, Cellulose triacetate, Cellulose acetate-cellulose nitrate, Non cellulosic reverse osmosis membranes.

A single-stage sea water test plant was designed, constructed, and made operational using the cellulose 2.83 acetate thin-film (250 A) composite membrane in the spiral-wound configuration. The plant, located at Seaworld on Mission Bay in San Diego, California, operates on unacidified sea water (pH=8.0) at an applied pressure of 68 atm (1000 psi) with 24 2-in. by 10-3/4-in. spiral-wound elements, each containing approximately 4 sq ft. of membrane. The sea water feed is pretreated by chlorination and sand filtration. The performance and reliability of the system have been excellent. To date, more than 100,000 hours of element testing have been completed. The total plant output of 850 gal/day corresponds to a membrane flux of about 10 gal/ft squared -day with 5% water recovery. The potable product water contains approximately 90 ppm total dissolved salts. The sodium chloride rejection is 99.75%. (OSW)
W74-11825

FIELD TESTING OF IMPROVED ION EXCHANGE TECHNIQUES,
Culligan, Inc., Northbrook, Ill.
S. A. Bresler, F. Husseini, and E. Kreusch.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 035/AS; $12.00 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-970, June 1974. 162 p, 60 fig, 34 tab. OSW Contract 14-30-3059.

Descriptors: *Desalination processes, *Pilot plants, *Ion exchange, Brackish water, *Onsite tests, Separation techniques, Testing.
Identifiers: TriplEx process, QuadruplEx process.

Pilot plant field tests were conducted at four sites to evaluate the potential of some new ion exchange techniques to desalt certain brackish waters. A three bed and four bed system were evaluated. The first bed contains a weak-acid resin, the second bed a strong-acid resin in the hydrogen form, and the third bed a weak-base or intermediate-base resin. In the four bed process, a fourth resin bed contains a strong-acid resin in the sodium form, through which a portion of the water passes. A review of the data indicates that resin performance was in substantial agreement with previously predicted values. (OSW)
W74-11826

PRELIMINARY EVALUATION OF FLUIDIC TECHNIQUES FOR FLOW MODULATION IN THE MULTI-STAGE FLASH DISTILLATION PROCESS,
Bowles Fluidics Corp., Silver Spring, Md.
P. A. Freeman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 186/AS; $8.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-974, January 1971. 77 p, 29 fig, 2 append. OSW Contract 14-01-0001-2226.

Descriptors: *Desalination plants, *Control systems, Bubbles, *Flash distillation, *Flow control, Fluid mechanics, *Brines, Design.
Identifiers: Fluidics, Fluidic diverter, Vortex modulator, Bubble gate modulator, Density modulator, Coanda effect, Two-phase fluid flow.

A preliminary evaluation of five fluidic flow modulation techniques to control the flow rate of flashing brine through a typical Multi-Stage Flash Distillation Plant was performed as the initial phase of development of a fluidic automatic brine level control system for the MSF process. A flow modulator based on the fluidic vortex amplifier concept was selected. This concept potentially modulates brine flows to 50% of full flow by bypassing less than 5% of full brine flow from an upstream stage. A preliminary design for the complete brine level control system is presented, based on the vortex modulator and other fluidic techniques. (OSW)
W74-11827

ANNUAL REPORT - SAN DIEGO TEST FACILITY, JANUARY 1, 1971 - FEBRUARY 15, 1972.
Burns and Roe Construction Corp., Paramus, N.J.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 171/AS; $17.50 in paper copy, $2.25 in microfiche. Office of Saline Water Report INT-OSW-RDPR-74-977, May 1974. 272 p, 55 fig, 49 tab. OSW Contract 14-30-2742.

Descriptors: *Distillation plants, *Flash distillation, Operations, Heat transfer, Corrosion, Corrosion control, Maintenance, *California, Evaporators.
Identifiers: Material evaluation, High temperature effect, Flash distillation module, Vertical tube evaporators, Horizontal tube evaporators, *San Diego(CA).

The Annual progress report is presented for the San Diego Test Facility located at Chula Vista, California for the period January 1, 1971 through February 15, 1972. Described are the technical and operational results for the Senator Clair Engle Plant (CEP), the high temperature Effect 1A (EIA), the (MSF) Flash Distillation Module, the Vertical Tube Evaporator Experimental Plant (VTEX), and the Lime-Magnesium-Carbonate (LMC) Plant. Also included are progress summaries in the area of material evaluation and development, chemistry related items, component evaluation studies, plant modifications, operational statistics and techniques and support areas. (OSW)
W74-11828

VTE EVAPORATORS FOR GEOTHERMAL BRINES,
Badger (W.L.) Associates, Inc., Ann Arbor, Mich.
F. C. Standiford.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 185/AS; $12.75 in paper copy, $2.25 in microfiche. Office of Saline Water Report INT-OSW-RDPR-74-975, June 1972. 150 p, 16 ref. OSW Contract 14-30-2955.

Descriptors: *Desalination processes, *California, Evaluation, *Design, Construction costs, *Evaporators, Evaporation, Heat transfer, *Brines.
Identifiers: *Imperial Valley(CA), *Geothermal brines, Feed brine temperatures, Blowdown concentrations, Heat rejection methods, Downflow heat transfer.

Conceptual designs and costs are presented for VTE evaporators to desalt hot geothermal brines, as from Imperial Valley, California. Basic unit capacity was 4 MGD and brine feed temperature 400F. Variables investigated included physical arrangement, upflow versus downflow heat transfer, feed brine temperature, product recovery ratio, and means of heat rejection. A five-effect downflow VTE rejecting heat to water used for reservoir recharge gave the lowest product cost (11.24 cents/1,000 gallons, exclusive of labor) at 90% load factor and 12% total charges on capital investment. (OSW)
W74-11829

200 MGD DESALTING PLANT CONCEPTUAL STUDY, ADVANCED THIN FILM DISTILLATION PROCESS AND TEST MODULE DESIGN.
Aqua-Chem, Inc., Waukeska, Wis.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 158/AS; $16.75 in paper copy, $2.25 in microfiche. Office of Saline Water Report INT-OSW-RDPR-74-979, October 1970. 219 p. OSW Contract 14-30-2637.

Descriptors: *Desalination plants, *Evaporators, *Flash distillation, *Design, *Water costs, Optimal Development plans.
Identifiers: Optimum combinations, Economic parameters.

The preparation of a conceptual design study of a 200 MGD sea water distillation desalting plant is presented. This large sized plant, intended for construction start about 1976, will bridge the technological gap between present distillation plants and the very large plants of the future. As a first phase of this program, a design was requested for a test module that would firmly establish the process technologies and projected economics of the 200 MGD plant. The distillation plant design recommended in this report incorporates the best engineering knowledge available to date; it also represents a distillation cycle and plant arrangement that will significantly reduce water costs over other available or contemplated plant designs. (OSW)
W74-11830

MSF DISTILLATION PLANT (MODULE), VERTICAL TUBE EVAPORATION (VTEX), SEMI-ANNUAL REPORT, JUNE 1, 1970, THROUGH DECEMBER 31, 1970,
Catalytic, Inc., Philadelphia, Pa.
M. C. Bushkoff.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 170/AS, $33.00 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-980, May 1974. 554 p, 207 fig, 27 tab, 13 ref, 13 append. OSW Contract 14-30-2652.

Descriptors: *Desalination plants, *Flash distillation, Heat transfer, Heat balance, Mass transfer, *Tubes, Separation techniques, *Design, Performance.
Identifiers: Brine hydraulics, Vapor-liquid separation.

The activities at the San Diego Test Facility for the period from June 30, 1970, to December 31, 1970, are reported. Emphasis is placed on the development work on the Vertical Tube Bundle Test Vehicle (VTEX). Its primary purpose is to obtain design information for large bundles of doubly fluted tubes. The development activities covered include large bundle heat transfer performance brine hydraulics, vapor-liquid separation, bundle venting, and materials evaluation. Process descriptions and updated flowsheets are presented

together with design and actual mass and energy balances. Plant performance, equipment and materials evaluation are discussed. The multi-Stage Flash (MSF) Test Module was operated only during intermittent shut-downs of the VTEX, and its development program was, of necessity, small. (OSW)
W74-11831

MANAGEMENT, OPERATION AND MAINTENANCE OF BRACKISH WATER TEST FACILITY, ROSWELL, NEW MEXICO, JULY 1970 - APRIL 1972,
Burns and Roe Construction Corp., Paramus, N.J.
A. R. Bernardi, and P. M. Mothes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 155/AS, $11.50 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-981, May 1974. 164 p, 27 fig, 18 tab. OSW Contract 14-30-2618.

Descriptors: *Desalination plants, Equipment, *Operations, Corrosion control, *Maintenance, Waste disposal, *New Mexico, Safety.
Identifiers: Operating experiences, *Roswell test facility(NM).

Work performed at the Roswell Test Facility, Roswell, New Mexico for the period July 1970 through April 1972 is described. Work consisted of maintaining the Roswell Test Facility in the best and safest possible condition in accordance with the best established industrial practices and to provide the supporting effective development, test and evaluation programs to advance the state-of-the-art of water conversion. (OSW)
W74-11832

PROTOTYPE REVERSE OSMOSIS WATER PURIFICATION UNIT,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
M. Pressman.
Available from NTIS, Springfield, Va 22161 as AD-769 601, Price $2.75 printed copy; $2.25 microfiche. Report No 2074, September 1973. 15 p, 3 fig, 5 tab.

Descriptors: *Reverse osmosis, *Desalination, *Water treatment, Turbidity, Salinity, Color, Dissolved solids.
Identifiers: *Camp A P Hill(VA).

A field study was made of a prototype 360-GPHA reverse osmosis water purification unit at Camp A.P. Hill, Virginia, during June 1973 to determine the production capacity and the capability of the system for removing color, turbidity, and dissolved salts from a highly colored, stagnant lake water, under field operating conditions. The prototype system, designed to produce 360 gph of product water at a 500-psi feed pressure, is capable of producing, at an average operating pressure of 555 psi, 414 gph of product water at 81F with no color, and with 0.2 Jackson Turbidity Units from a natural feedwater containing 185 units of color and 21 units of turbidity. Additional research is needed to improve the flocculation-clarification process of the filter component. A field method is needed for determining the optimum polymer dosage. (Knapp-USGS)
W74-11988

3B. Water Yield Improvement

FUTURE WATER SUPPLY REQUIREMENTS AND ALTERNATIVE SOURCES OF SUPPLY AT AMES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-11617

STRUCTURE AND MODIFICATION OF CLOUDS AND FOGS,
State University of New York, Albany.
B. Vonnegut.
Available from NTIS, Springfield, Va. 22161 as AD-772 821, Price $3.00 printed copy; $2.25 microfiche. Air Force Cambridge Research Laboratories Technical Report 73-0532, September 1973. 17 p, 34 ref. Contract F19628-68-C-0057.

Descriptors: *Cloud physics, *Atmospheric physics, Laboratory tests, Meteorology, Thunderstorms, Precipitation(Atmospheric), Cloud seeding, Silver iodide, Lightning, *Weather modification, Raindrops.

The physical and chemical processes occurring in the atmosphere were studied in a vertical wind tunnel, having a throat diameter of 2 meters. The distribution of drop size produced by the breakup of large water drops under turbulent conditions was studied through the release of bulk water. The transfer of material as a result of the bursting of bubbles at an airwater interface was used to study the injection of particulate matter and nuclei into the atmosphere. Instruments were developed for the measurement of cirriform clouds, and experiments were carried out on the artificial production of ice-crystal clouds under conditions of supersaturation in the clear air. The role of strong electric fields in the production of ice crystals was investigated. Electrical discharges between clouds of intensely charged aerosols were studied. Improved ice forming nuclei were prepared by modifying the lattice constant of silver iodide. Apparatus for the production of large and intense electric fields was used to study the propagation of corona streamers. Studies of fair-weather atmospheric electricity were carried out. Numerous potential gradient soundings were made. Experiments were carried out establishing the feasibility of directly measuring large potential differences in the atmosphere by the use of a tethered balloon and a nul balancing electrical system. (Knapp-USGS)
W74-11745

MISSISSIPPI RIVER WATER FROM TEXAS,
Universidad Nacional de Nicaragua, Managua.
For primary bibliographic entry see Field 4A.
W74-11766

PROJECT SKYWATER.
Nevada Univ., Reno. Lab. of Atmospheric Physics.
Available from NTIS, Springfield, Va. 22161 as PB-220 674 Price $4.50 printed copy; $2.25 microfiche. Desert Research Institute Reno, Nevada, Final Report to Bureau of Reclamation June 1972. 68 p, 79 fig, 3 tab. USDI Contract 14-06-D-6632-1968.

Descriptors: *Weather modification, *California, *Cloud seeding, Cloud physics, Chemistry of precipitation, Artificial precipitation, Silver iodide, Snow, Rainfall.
Identifiers: Sierra Nevada(CA).

Winter storms were studied in the Sierra Nevada to devise methods of augmenting precipitation. The studies include structure of the cloud systems--their depth and degree of convectivity; water droplet and ice particle economy of the clouds, forming the medium within which hydrometeor generation and growth occurs; transport and diffusion of silver iodide aerosol particles, and the ballistic paths of the hydrometeors; and relation of these factors to the synoptic and mesoscale characteristics of the storm. The systems necessary to make these studies include an instrumented aircraft capable of flying for long periods in storm conditions; a mountaintop radar, the data from which are transmitted by landline to the laboratory where they are presented in real time and stored on magnetic tape for later analysis; a trace analysis laboratory for the determination of the silver content of snow; and a mesoscale network of precipitation gages and snow sampling towers. (Knapp-USGS)
W74-11778

EXPERIMENTAL RESEARCH IN THE ARTIFICIAL CONTROL OF PRECIPITATION DURING THE COLD PERIOD OF YEAR ON AN EXPERIMENTAL METEOROLOGICAL RANGE,
B. N. Leskow, and I. P. Polovin.
Available from NTIS, Springfield, Va. 22161 as AD-772 006 Price $3.00 printed copy; $2.25 microfiche. Air Force Foreign Technology Division Machine Translation FTD-MT-24-216-74, November 1973. 13 p, 2 fig, 1 tab, 25 ref. (Translated from Trudy v Vsesoyuznogo Meteorologicheskogo S'Yezda, Sektsiya Aktivnykh Vozdeystviy na Atmosfernyye Protsessy, Vol 4, p 53-61, 1972).

Descriptors: *Cloud seeding, *Artificial precipitation, Meteorology, Weather modification, Cloud physics, Water yield improvement.
Identifiers: *USSR.

Many experiments have been conducted on the experimental meteorological range of UkrNIGMI (Ukrainian Scientific Research Hydrometeorological Institute) on the effect on supercooled clouds of laminar forms for the purpose of studying artificial control of precipitation during the cold period of the year. Dry ice was introduced from an aircraft as the reagent. The aircraft flies at the level of the upper limit of a cloud layer suitable for seeding. The line of seeding is perpendicular to the wind direction at the level of flight and is constant relative to the terrain. The location of this line is selected in such a way that artificial precipitation would fall out near the center of the area with the dense precipitation-measurement network. The increase in precipitation in experiments for the most part was 0.5-1 mm, but in some experiments it reached 2.44 mm. The average change in the precipitation calculated from all experiments was +0.74 mm with the average duration of effect 2 h, 10 min. The relative increase decrease with an increase in the intensity of natural precipitation. Weak natural precipitation was increased in the experiments by 200% or more, average precipitation by 80%-120%, and strong precipitation by 40%-50%. The average relative increase calculated for all experiments was 100%. (Knapp-USGS)
W74-11782

THE USE OF ICE-FORMING AEROSOLS FOR CLOUD MODIFICATION AND RESULTS OF INVESTIGATIONS OF NEW ICE-FORMING REAGENTS,
M. Ya. Aksenov, R. A. Bakhanova, G. M. Bashkirova, N. F. Bogatova, and A. V. Bromberg.
Available from NTIS, Springfield, Va. 22161 as AD-772 147 Price $3.00 printed copy; $2.25 microfiche. Air Force Foreign Technology Division Machine Translation Report 24-215-74, December 1973. 12 p, 1 fig, 30 ref. (Translated from Trudy v Vsesoyuznogo Meteorologicheskogo S'yezda, Sektsiya Aktivnykh Vozdeystviy na Atmosfernyye Protsessy, Gidrometeoizdat, Leningrad, Vol 4, p 45-52, 1972.)

Descriptors: *Weather modification, *Cloud seeding, *Aerosols, Silver iodide, Reviews, Research and development.
Identifiers: *USSR.

Ice-forming aerosols used in the USSR as the basic means of modification of all forms of cumulus clouds are reviewed. Investigations of ice-forming substances, obtaining of effective aerosols, and development of methods of introduction of these reagents into the zone of action are given considerable attention in the USSR. (Knapp-USGS)
W74-11783

3C. Use Of Water Of Impaired Quality

LAND APPLICATION OF SEWAGE EFFLUENTS AND SLUDGES: SELECTED ABSTRACTS,
Robert S. Kerr Environmental Research Laboratory, Ada, Okla.
For primary bibliographic entry see Field 5D.
W74-11577

AN EVALUATION OF FARM IRRIGATION PRACTICES AS A MEANS TO CONTROL THE WATER QUALITY OF RETURN FLOW,
Utah State Univ., Logan.
R. J. Hanks, J. C. Anderson, L. G. King, S. W. Childs, and J. R. Cannon.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 408, $3.75 in paper copy, $2.25 in microfiche. Utah Agricultural Experiment Station, Logan, Research Report No 19, July 1974. 48 p, 15 fig, 12 tab, 10 ref. OWRR-A-018-UTAH(1). 14-31-0001-4045.

Descriptors: *Return flow, *Salinity, Evapotranspiration, Plant growth, Management, Soil water, Salts, *Model studies, *Irrigation practices, *Water quality control, Evaluation, Hydrologic models, Costs.
Identifiers: Economic models.

A physical and economic model has been devised to evaluate irrigation practices as related to irrigation return flow. The physical model requires data of soil water properties, irrigation rates and amounts, potential evapotranspiration and plant rooting properties. Output data include salt and water flow into the water table and relative transpiration. The economic model requires data on cost of irrigation, value of crop, cost of production etc. Output data include net revenue and shadow price as a function of salt outflow. The model predicts that net revenue increases as salt flow increases and that the shadow price (the increase in revenue per unit increase in salt outflow) falls off rapidly as salt outflow increases. It would appear that reasonable water management practices could be achieved that reduce salt outflow on the farm at about a cost of $1 per ton.
W74-11681

INDUSTRIAL WASTE WATER RECOVERY AND REUSE,
Betz Environmental Engineers, Inc., Plymouth Meeting, Pa. Dept. of Industrial Concept Design.
For primary bibliographic entry see Field 5D.
W74-11914

SOIL SYSTEMS FOR MUNICIPAL EFFLUENTS - A WORKSHOP AND SELECTED REFERENCES,
East Central State Coll., Ada, Okla. School of Environmental Science.
For primary bibliographic entry see Field 5D.
W74-11924

EVALUATION OF IRRIGATION SCHEDULING FOR SALINITY CONTROL IN GRAND VALLEY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W74-11929

3D. Conservation In Domestic and Municipal Use

PLANNING AND ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 6A.
W74-11451

METROPOLITAN WATER INTELLIGENCE SYSTEMS--COMPLETION REPORT, PHASE III,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-11457

URBAN WATER RESOURCES--SOME PLANNING FUNDAMENTALS,
Cornell, Howland, Hayes and Merryfield, Reston, Va.
For primary bibliographic entry see Field 6B.
W74-11645

DAMAGE ASSESSMENT OF HOUSEHOLD WATER QUALITY,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5C.
W74-11646

PROCEEDINGS: PLANNING AND DESIGN FOR URBAN RUNOFF AND SEDIMENT MANAGEMENT.
For primary bibliographic entry see Field 4D.
W74-11678

PROCEEDINGS OF THE URBAN WATER ECONOMICS SYMPOSIUM.
Newcastle Univ. (Australia). Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-11682

HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEXAS, METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2F.
W74-11737

FLOOD PLAIN MANAGEMENT IN METROPOLITAN CHICAGO,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 6F.
W74-11867

CITY OF MANCHESTER--MAIN DRAINAGE WORK 6,
For primary bibliographic entry see Field 4A.
W74-11868

3E. Conservation In Industry

MERCURY RECOVERY FROM PROCESS SLUDGES,
Georgia-Pacific Corp., Bellingham, Wash.
For primary bibliographic entry see Field 5D.
W74-11699

SOLVENT EXTRACTION OF NITRATE FROM TITANIUM LEACHER EFFLUENT,
Bureau of Mines, Salt Lake City, Utah. Salt Lake City Metallurgy Research Center.
For primary bibliographic entry see Field 5D.
W74-11763

WATER AND WASTE MANAGEMENT IN POULTRY PROCESSING,
North Carolina State Univ., Raleigh.
For primary bibliographic entry see Field 5D.
W74-11789

GRANITE INDUSTRY WASTEWATER TREATMENT,
Vermont Dept. of Water Resources, Montpelier. Agency of Environmental Conservation.
For primary bibliographic entry see Field 5D.
W74-11790

STATE-OF-THE-ART: URANIUM MINING, MILLING, AND REFINING INDUSTRY.
Robert S. Kerr Environmental Lab., Ada, Okla.
For primary bibliographic entry see Field 5D.
W74-11791

COLOR CHARACTERIZATION BEFORE AND AFTER LIME TREATMENT,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 5D.
W74-11793

PROTEIN PRODUCTION FROM ACID WHEY VIA FERMENTATION,
Milbrew, Inc., Juneau, Wis. Amber Lab. Div.
For primary bibliographic entry see Field 5D.
W74-11795

INDUSTRIAL WASTE WATER RECOVERY AND REUSE,
Betz Environmental Engineers, Inc., Plymouth Meeting, Pa. Dept. of Industrial Concept Design.
For primary bibliographic entry see Field 5D.
W74-11914

3F. Conservation In Agriculture

WATER SUPPLIES AND COST IN RELATION TO FARM RESOURCE USE DECISIONS AND PROFITS ON SACRAMENTO VALLEY FARMS,
California Univ., Davis. Dept. of Agricultural Economics.
T. R. Hedges.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 310, $4.50 in paper copy, $2.25 in microfiche. Giannini Foundation Research Report No 320, March 1974. (California Water Resources Center Project UCAL-WRC-W-111). 93 p, 11 fig, 17 tab, 34 ref. OWRT-B-068-CAL(1).

Descriptors: *Water supply, *Water costs, Economics, *California, *Crop production, *Input-output analysis, Irrigation practices, *Linear programming, Profit, Farm prices, Water allocation(Policy), *Farm management.
Identifiers: *Sacramento Valley(Calif).

This study of the mixed crop agricultural economy of Sacramento Valley, California identifies and establishes physical input-output relationships for water and crop yields within relevant ranges, evaluates the impact of prices for products and costs for input factors upon water allocation among such crops and alternative irrigation practices and maximum earnings and profits. Linear programming is used to evaluate the various constraints of water supply, land quality, crop prices, and input costs for the several crops and sizes of farms. Two sizes of farms are analyzed in the study: (1) The 1,280 acre model farm is typical of the rice-barley-bean large farm situated on basin soils in the upper Sacramento Valley. Tomatoes and sugar beets enter the cropping mix for this size

farm under certain high-price low-cost situations of abundant water supply. (2) The 640 acre model farm is typical of the tomato-sugar beet-bean-hay mixed crop farm on alluvial soils of the lower Sacramento Valley. The tomato-beet-hay crop mix is optimal for abundant low-cost water situations but increasing costs and/or decreasing water supply brings barley, safflower, and wheat into the mix. (Snyder-California, Davis)
W74-11568

SELECTED IRRIGATION RETURN FLOW QUALITY ABSTRACTS 1972-1973, THIRD ANNUAL ISSUE.
Dept. of Agricultural Engineering. EPA, Office of Research and Development Colorado State Univ., Fort Collins, Colo.
For primary bibliographic entry see Field 5G.
W74-11576

AN EVALUATION OF FARM IRRIGATION PRACTICES AS A MEANS TO CONTROL THE WATER QUALITY OF RETURN FLOW,
Utah State Univ., Logan.
For primary bibliographic entry see Field 3C.
W74-11681

SOME CONSTRAINTS OF SPREADING SLUDGE ON CROPLAND,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W74-11838

METHODS OF LIQUID FERTILIZER APPLICATION,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-11839

EQUIPMENT FOR INCORPORATING SEWAGE SLUDGE AND ANIMAL MANURES INTO THE SOIL,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-11840

MERCHANDISING HEAT-DRIED SLUDGE,
Milwaukee Sewerage Commission, Wis.
For primary bibliographic entry see Field 5D.
W74-11842

EPA VIEWPOINT ON LAND APPLICATION OF LIQUID EFFLUENTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 5D.
W74-11844

PESTICIDE TRANSPORT AND RUNOFF MODEL FOR AGRICULTURAL LANDS,
Hydrocomp, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 5B.
W74-11920

TIME OF TRAVEL AND DYE DOSAGE FOR AN IRRIGATION CANAL SYSTEM NEAR DUCHESNE, UTAH,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 2E.
W74-11970

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

METHODS OF FLOOD FLOW DETERMINATION IN SPARSE DATA REGIONS,
Alaska Univ., College. Inst. of Water Resources.
R. F. Carlson, P. M. Fox, and S. D. Shrader.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 261; $3.25 in paper copy, $2.25 in microfiche. Partial Completion Report No LWR-52, June, 1974. 37 p, 2 fig, 40 ref, append. OWRTB-021-ALAS(1).

Descriptors: *Alaska, *Design flood, History, *Hydrologic data, Statistical methods, Rational formula, Reliability, *Flood frequency, Peak discharge, *Flood forecasting, Graphical analysis.
Identifiers: Physiographic regions, Emperical formulae, Graphical analysis.

Three issues must be undeslo when embarking on a flood frequency design task: the fundamental basis of the design method, actual execution of the task, and the data environment. A survey of the history and background of the many methods of flood frequency determination is included, followed by a description of the methods currently used by design agencies in Alaska. The physical environment of Alaska is described including identification of four homogenous physiographic regions. The data conditions are also described for these regions. With this information three methods were chosen for further evaluation: log Pearson type III, graphical and regional multiple regression. These methods were chosen primarily on the basis of applicability to sparse data regions; ease of calculation; superficial satisfaction of underlying assumptions; and general acceptance and/or previous use in Alaska.
W74-11458

FLOOD FREQUENCY ESTIMATION IN NORTHERN SPARSE DATA REGIONS,
Alaska Univ., College. Inst. of Water Resources.
R. F. Carlson, and P. M. Fox.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 262; $3.00 in paper copy, $2.25 in microfiche. Completion Report No IWR-55, July, 1974. 15 p, 1 fig, 3 ref. OWRTB-021-ALAS(2).

Descriptors: *Flood frequency, Snowmelt, Energy budget, Probability, Evaluation, Design flood, *Alaska, Model studies, *Flood forecasting, Hydrologic data.
Identifiers: *Snowmelt models, *Kinematic waves, Log Pearson type III.

With the increased emphasis placed on resource extraction in Northern regions, consideration of the effects of sparse data on flood frequency estimation required for design decision is needed. Results are summarized of a project designed to deal with those needs. Following a survey of existing methods and current physiographic and data conditions three methods were chosen to be compared using data from eleven diverse basins in Alaska. These three methods were compared on the basis of efficiency, consistency, and power as well as record length requirements, and satisfaction of underlying assumptions. A heat budget type snowmelt model was modified for use on the Chena River basin, and checked with snow survey data for accuracy. The output from the model was then used for flood predictions with a hybrid flood frequency model which combined stochastic input and kinematic wave theory. This fourth approach was also evaluated. Criteria were developed to determine which method is applicable for a given situation. Due to the variability of the physical and data environment of northern regions, no one method should be strictly adhered to for flood frequency determination.
W74-11459

FLOW SIMULATION SYSTEM,
Metropolitan Sanitary District of Greater Chicago, Ill., Industrial Waste Div.
For primary bibliographic entry see Field 2E.
W74-11477

USE OF DEPTH FLOATS IN DRAINAGE CANALS WITH AQUATIC WEED,
Hydraulic Research Inst., Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 7B.
W74-11510

MEASUREMENT AND ESTIMATION OF FLOOD DISCHARGES,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11524

MEASUREMENT OF DISCHARGE AS INFLOW INTO LEAKY RESERVOIRS,
Agricultural Research Service, Riesel, Tex.
For primary bibliographic entry see Field 7B.
W74-11529

PROBLEMS OF FLOW MEASUREMENT IN LARGE RESERVOIRS,
Hydraulic Research Inst., Prague (Czechoslovakia).
For primary bibliographic entry see Field 7B.
W74-11532

A CONSTANT DISCHARGE SIPHON FOR FLOW MEASUREMENT AND CONTROL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 7B.
W74-11534

EARTH SATELLITES AND THEIR APPLICATIONS IN HYDROMETRY AND HYDROLOGY,
National Environmental Satellite Center, Suitland, Md.
For primary bibliographic entry see Field 7B.
W74-11553

MEASURING DEVICES IN STATIONARY AND MOBILE CONTROL STATIONS FOR THE SUPERVISION OF RIVERS, SHOWN BY THE EXAMPLE OF THE LIPPE AND EMSCHER RIVERS,
Emschergenossenschaft, Essen (West Germany).
For primary bibliographic entry see Field 7B.
W74-11554

RADIO CONTROL OF WATER LEVEL GAUGES IN WATERCOURSES ENDANGERED BY HIGH WATER LEVELS,
Emschergenossenschaft, Essen (West Germany).
For primary bibliographic entry see Field 7B.
W74-11557

ECOLOGICAL IMPACT OF THE IN-LINE ARRANGEMENT OF TWO RESERVOIRS AND A METROPOLITAN AREA,
Drake Univ., Des Moines, Iowa,
For primary bibliographic entry see Field 5C.
W74-11571

LOW ENERGY MECHANICAL METHODS OF RESERVOIR DESTRATIFICATION,
Oklahoma State Univ., Stillwater. School of Agricultural Engineering.

J. E. Garton, C. E. Rice, J. M. Steichen, and J. E. Quintero.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 338, $3.75 in paper copy, $2.25 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, Completion Report, (1974). 50 p, 23 fig, 2 tab, 24 ref. OWRT A-028-OKLA(1), 14-31-0001-4036.

Descriptors: *Stratification, *Destratification, *Pumping, Pumps, Reservoirs, Water quality, Dissolved oxygen, Algae, *Reservoir operation, Design.
Identifiers: *Axial flow pumps, Mechanical pumping, *Pump design.

The objective was to evaluate reservoir stratification causing degradation of large volumes of water each summer. Many attempts have been made to destratify lakes. Generally, destratification devices have large power requirements. The first phase of this research involved the design, construction and testing of a high volume, low head destratification pump. In the second phase this axial flow pump was modified and was capable of moving 0.99 cubic meters per second of water from near the surface to near the bottom of the lake using 373 watts. The chief objective of the second phase was to determine the effectiveness of the pump as a destratification device. Fifteen days were required to lower the stability of a 40 hectare lake to near zero. The destratification efficiency was 4.6%. Destratification of all physical-chemical parameters was observed. Future research could involve a long term biological study of the effect of destratification, operation of larger pump on a larger lake and model studies required to fit pump design to lake size.
W74-11572

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, FIFTH VOLUME,
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 6A.
W74-11574

HYPOLIMNETIC FLOW REGIMES IN LAKES AND IMPOUNDMENTS,
Pennsylvania Univ., Philadelphia. Dept. of Civil and Urban Engineering.
For primary bibliographic entry see Field 8B.
W74-11578

THE USE OF STATISTICAL DISTRIBUTIONS FOR DETERMINING THE MAGNITUDE AND FREQUENCY OF FLOODS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6A.
W74-11611

WATER CONTROL ON AGRICULTURAL LAND,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6B.
W74-11612

URBAN FLOOD DAMAGES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-11622

LEAST COST DESIGN OF BRANCHED PIPE NETWORK SYSTEM,
Weston (Roy F) Inc., West Chester, Pa.
For primary bibliographic entry see Field 8B.
W74-11647

FLOOD PLAIN INFORMATION, OHIO RIVER: OHIO COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for: The Wheeling-Ohio County Planning Commission and The State of West Virginia Department of Natural Resources, December, 1971. 47 p, 10 fig, 16 plates, 11 tab, glossary.

Descriptors: *Floodplain, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Rivers, Bridges, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstructions to flow.
Identifiers: Ohio County(W Va), Wheeling(W Va), Wheeling Creek(W Va), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Wheeling is the major city of Ohio County which is situated on the left or east bank of the Ohio River from Mile 81.5 to 92.9 downstream of Pittsburgh, Pa. Above Ohio County the Ohio River has a moderately wide floodplain and relatively flat river gradient (a slope of 0.6 ft/mi for the report reach). Wheeling Creek is a major tributary and is itself subject to flooding. The main flood season is December through April and flood duration is relatively long. Major obstructions to Ohio River flows are Locks and Dams 12 and 13 which will be replaced by the Hannibal Locks and Dam, a structure equipped with gates to allow underpassage of flows. Possible obstructions to Wheeling Creek flows are 11 railroad bridges, 21 highway bridges and 1 foot bridge. Thirteen upstream flood control projects are effective in reducing flood levels on the Ohio River in Ohio County from 6 to 9 feet. A watershed plan for Wheeling Creek, proposing the construction of 6 flood control dams and one multipurpose dam is nearing completion. Using gage records for a 108 year continuous period, characteristics of an Intermediate Regional Flood (IRF) on the Ohio River were determined. With a peak discharge of 394,000 cubic ft./sec. and an elevation of 659.0 m.s.l. on Lock and Dam 12 upper gage, an IRF will rise 1.1 foot above the March 1964 flood, the last major disaster, and 7 feet below the March, 1936 flood which discharged 499,000 cfs. and was the greatest flood on the Ohio in this area. Similarly, an IRF on Wheeling Creek would discharge 31,500 cfs., compared to 52,000 cfs. for a Standard Project Flood, considered a reasonable upper limit of flooding. Complete flood profiles were compiled for these hypothetical floods, and are presented on topographic maps. (LaPointe-North Carolina)
W74-11677

PROCEEDINGS OF THE URBAN WATER ECONOMICS SYMPOSIUM.
Newcastle Univ. (Australia). Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-11682

URBAN WATER SUPPLY CATCHMENTS: SOME ILLUSTRATIONS OF RESOURCE ALLOCATION AND CONFLICT REGULATION,
Macquarie Univ., North Ryde (Australia).
For primary bibliographic entry see Field 6B.
W74-11684

RURAL AND URBAN FLOOD INSURANCE: A REVIEW,
New South Wales Dept. of Agriculture, Sydney (Australia).
For primary bibliographic entry see Field 6F.
W74-11688

SAMPLING ERRORS IN FLOOD DAMAGE ESTIMATES,
New South Wales Univ., Kensington (Australia).
For primary bibliographic entry see Field 6F.
W74-11690

ON A FLOOD PLAIN: CAN A RIGHT GO WRONG,
Office of the Chief of Engineers (Army), Washington, D.C.
For primary bibliographic entry see Field 6F.
W74-11698

EXTRACTING LAND USE INFORMATION FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE DATA BY CONVENTIONAL INTERPRETATION METHODS,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7B.
W74-11729

COMPUTER MODEL FOR DETERMINING BANK STORAGE AT HUNGRY HORSE RESERVOIR, NORTHWESTERN MONTANA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11732

FLOOD PROFILES OF THE LOWER HILLSBOROUGH RIVER, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2E.
W74-11735

APPLICATION OF REMOTE SENSING IN THE STUDY OF VEGETATION AND SOILS IN IDAHO,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
E. W. Tisdale.
Available from NTIS, Springfield, Va. 22161 as N73-22287, Price $3.00 printed copy; $2.25 microfiche. Interim Contract Report for NASA, Goddard Space Flight Center, May 1973. 17 p, 1 tab, 2 append. NASA Contract NAS5-21850.

Descriptors: *Remote sensing, *Satellites(Artificial), *Land use, *Idaho, Soil investigations, Mapping, Data collections, Terrain analysis, Grasslands.

ERTS and U-2 multispectral imagery was used to inventory and monitor renewable natural resources in Idaho with particular emphasis on natural vegetation. Sagebrush, cheatgrass, and artificially seeded ranges were readily identified as well as woodland, dense forest, and riparian vegetation. Irrigated farm areas were readily segreated from those where dryland cropping is practiced. Lakes, reservoirs, ponds, and river channels were easily identified in MSS-7. In general, vegetational patterns are more discernible in MSS-5 than in other bands. Water bodies are best defined in MSS-7. Geologic features show up well in both MSS-5 and MSS-7. U-2 imagery provides considerable additional information and is highly useful in separation of major sagebrush-grass types. Imagery during the growing season (spring) should aid in the separation of range types on the basis of their moisture status. (Knapp-USGS)
W74-11738

ESTIMATING FLOOD DISCHARGES IN NEVADA USING CHANNEL-GEOMETRY MEASUREMENTS,
Geological Survey, Carson City, Nev.
D. O. Moore.
Nevada Highway Department Hydrologic Report No 1, 1974. 43 p, 46 fig, 1 tab, 5 ref, append.

Descriptors: *Floods, *Nevada, *Peak discharge, *Channel morphology, Alluvial channels, Discharge(Water), Flood frequency, Flood recurrence interval.

An empirical method is given for reliably estimating 10-year recurrence-interval floods in Nevada.

This flood characteristic is related to the width and average depth of stream channel cross sections between point and channel bars. Different relations are required to estimate the flood discharges for different areas within Nevada, because the State is not homogeneous with respect to flood characteristics. Also, relations are different for ephemeral and perennial streams. The standard error of estimate for the 10-year flood, in both ephemeral and perennial channels throughout the State, is about 40 percent. No relation was developed to estimate floods for perennial streams in southern Nevada due to the limited data available. A relation was developed between the 10 and 25 year recurrence-interval floods, which may be used to estimate the 25-year recurrence-interval flood. (Knapp-USGS)
W74-11742

LOW-FLOW CHARACTERISTICS OF SELECTED STREAMS IN THE SABINE RIVER BASIN DOWNSTREAM FROM TOLEDO BEND RESERVOIR,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 2E.
W74-11743

FLOODS OF JANUARY 1974 IN WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2E.
W74-11752

MISSISSIPPI RIVER WATER FROM TEXAS,
Universidad Nacional de Nicaragua, Managua.
O. Arguello, and R. G. Kazmann.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 99, No IR4, Paper 10212, p 441-448, December 1973. 2 fig, 1 tab, 7 ref. OWRR A-016-LA(3).

Descriptors: *Inter-basin transfers, *Mississippi River, *Louisiana, *Texas, Water resources development, Water transfer, Diversion.

The impact of removing 12,000,000 acre-ft annually from the Mississippi River for export to the High Plains of Texas was studied by a mathematical model that utilized the daily discharge of the river for the 1928-1967 period as its basis. Constraints were the salinity of the River at Port Sulphur and New Orleans, available reservoir storage in Texas, and rates of diversion ranging from 18,000 cfs to 28,000 cfs. A diversion rate of at least 24,000 cfs was found necessary in order to reduce the duration of diversion. Diversion at a lesser rate and longer period would increase the number of days of abnormally salty river water at New Orleans. The total annual cost of water is estimated to be between $72 per acre-ft and $114 per acre-ft delivered. (Knapp-USGS)
W74-11766

SURFACE-WATER AVAILABILITY, TALLADEGA COUNTY, ALABAMA,
Geological Survey, University, Ala.
For primary bibliographic entry see Field 7C.
W74-11767

RAIN RETENTION BASINS AND RAINWATER DISCHARGES (REGENBECKEN UND REGENENTLASTUNGEN),
For primary bibliographic entry see Field 5D.
W74-11854

FLOOD PLAIN MANAGEMENT IN METROPOLITAN CHICAGO,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 6F.
W74-11867

CITY OF MANCHESTER--MAIN DRAINAGE WORK 6,
D. N. Young.
The Institution of Municipal Engineers Journal, Vol 101, No 4, p 109-116, April, 1974. 4 fig.

Descriptors: *Drainage area, *City planning, *Design criteria, History, Flow, Monitoring, Sampling, Sewer systems, Automation, Recording, Runoff, Gauges, Models.
Identifiers: *United Kingdom(Manchester-Eng).

Developments of main drainage facilities within the city of Manchester since 1885 and present measures taken to improve the redevelopment requirements of the Openshaw area are described. Storm overflow, old mine workings, and coal seams from a colliery are taken into account in the general design. Over the past year, research work by the city engineer and surveyor's department was done on the volume of flow generated within a catchment area together with the efficient performance of stilling pond storm water overflows. Flows will be monitored from this area by an automatic pneumatic depth recorder for both dry weather and storm water sewers. Ultimately sampling equipment will be expanded. By automatic rainfall intensity recording gauges, theoretical and actual runoff will be compared. In addition, assessment of the performance of the performance of the stilling pond type overflow will be made. These results should provide information for further design criteria for sewer systems in the area. (Prague-FIRL)
W74-11868

TOCKS ISLAND LAKE PROJECT,
Tippetts-Abbett-McCarthy-Stratton, New York.
For primary bibliographic entry see Field 6A.
W74-11891

A HYDROLOGICAL STUDY OF THE SOUTHERN SUDD REGION OF THE UPPER NILE,
Institute of Hydrology, Wallingford (England).
J. V. Sutcliffe.
Hydrological Sciences Bulletin, Vol 19, No 2, p 237-255, June 1974. 10 fig, 3 tab, 9 ref.

Descriptors: *Hydrologic aspects, *Water resources, *Watersheds(Basins), *Rivers, Hydrology, Floods, Discharge(Water), Water levels, Hydrologic data, Drainage, Surface waters, Vegetation, Control, Land management, Flooding, Flow rates, River flow, Topography, Slopes, Flood plains, Regional economics.
Identifiers: *Sudan(White Nile).

The economy is closely linked to the natural river regime; any control of the 160 km reach of the White Nile River from Juba to Bor (Sudan) will have far-reaching consequences for the local inhabitants. Data on vegetation and water levels were obtained for 43 cross sections of the river valley. The alluvial bank of the main river and all spill channels were surveyed for two sample reaches. The seasonal range of river flow at Mongalla was related to the climate and lake storage upstream. The topography of the flood-plain was described. Analysis of the flood-plain cross sections revealed a succession of gradients caused by recent deposition in discontinuous basins below the river levels, and study of gauge records confirmed a change in river profile. The basins act as auxiliary channels and also as a series of damping reservoirs which store water and return it to the river. The vegetation distribution on the flood-plain revealed that flooding controlled the vegetation. The economy of the area was closely related to the hydrological conditions. Flooding conditions and climatic variations limited the area of different grasses. Where the climate made crop yields unreliable, the seasonal fluctuations in river level provided grazing during the dry season making a pastoral economy possible. (Humphreys-ISWS)
W74-11905

REMOTE SENSING STUDY OF LAND USE AND SEDIMENTATION IN THE ROSS BARNETT RESERVOIR, JACKSON, MISSISSIPPI, AREA,
University of Southern Mississippi, Hattiesburg.
W. T. Mealor, Jr., J. W. Pinson, D. L. Wertz, C. M. Hoskin, and D. C. Williams.
Available from NTIS, Springfield, Va. 22161 as N73-18396, Price $7.00 printed copy; $2.25 microfiche. First Annual Contract Report to National Aeronautics and Space Administration, 1973. 81 p, 6 fig, 6 append. NASA Grant NGL 25-005-007.

Descriptors: *Remote sensing, *Land use, *Sedimentation, *Mississippi, Reservoir silting, Urban runoff, Aerial photography, Water pollution sources, Cities.
Identifiers: Jackson(MS), Ross Barnett Reservoir(MS).

Sediment and other culturally induced affluents in the Ross Barnett Reservoir, Mississippi, and their spatial linkages and relationships with land use and site characteristics were studied using remote sensing techniques. The principal objectives of the Ross Barnett Reservoir study are the determination through remote sensing techniques of (1) land use types, (2) effect of land use on erosion within the immediate vicinity of the reservoir, (3) the suspended sediment within the reservoir, and (4) correlation of suspended sediment with land use in the immediate reservoir vicinity. (Knapp-USGS)
W74-11963

TIME OF TRAVEL AND DYE DOSAGE FOR AN IRRIGATION CANAL SYSTEM NEAR DUCHESNE, UTAH,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 2E.
W74-11970

VARIATION IN BLUFF RECESSION IN RELATION TO LAKE LEVEL FLUCTUATIONS ALONG THE HIGH BLUFF ILLINOIS SHORE,
Lake Michigan Federation, Chicago, Ill.
For primary bibliographic entry see Field 2J.
W74-11974

SELECTED HYDROLOGIC DATA IN THE UPPER COLORADO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-11979

AVAILABILITY OF DATA ON SURFACE-WATER QUANTITY AND QUALITY FOR THE SAN FRANCISCO BAY REGION, CALIFORNIA, WITH A SUMMARY OF BENEFICIAL USES AND IMPLICATIONS FOR LAND USE,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W74-11980

GEOLOGY AND GROUNDWATER FOR LAND-USE PLANNING IN THE EAGLE RIVER-CHUGIAK AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 4B.
W74-11982

WATER RESOURCES OF THE LARAMIE, SHIRLEY, HANNA BASINS AND ADJACENT AREAS, SOUTHEASTERN WYOMING,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-11983

SEEPAGE IN MISSISSIPPI RIVER BANKS: REPORT 1, ANALYSIS OF TRANSIENT SEEPAGE USING A VISCOUS-FLOW MODEL AND THE

FINITE DIFFERENCE AND FINITE ELEMENT METHODS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
C. M. Desai.
Available from NTIS, Springfield, Va 22161 as AD-762 556, Price $3.00 printed copy; $2.25 microfiche. Technical Report S-73-5, May 1973. 105 p, 45 fig, 2 tab, 59 ref, 1 append.

Descriptors: *Seepage, *Bank storage, *Mississippi River, *Bank stability, Surface-groundwater relationships, Bank protection, Erosion control, Numerical analysis, Hydraulic models.

The stability of the banks of the Mississippi River is dependent in part upon seepage conditions induced by variations in the river level. The drawdown conditions are significant for the design of stable riverbank slopes and protective structures. A parallel-plate, viscous-flow model was designed and constructed for the purpose of conducting tests that simulate seepage conditions and variations of external water levels in the field. A finite difference scheme was developed for solving approximate equations governing one- and two-dimensional fluid flow. (Knapp-USGS)
W74-11989

AN APPROACH TO ESTIMATING FLOOD FREQUENCY FOR URBAN AREAS IN OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
V. B. Sauer.
Water Resources Investigations 23-74, July 1974. 10 p, 3 fig, 11 ref.

Descriptors: *Flood frequency, *Urban hydrology, *Oklahoma, *Urban runoff, *Storm runoff, Urbanization, Peak discharge, Rainfall intensity, Flood recurrence interval.

Flood-frequency studies for urban areas in several parts of the United States and flood-frequency relations for natural streams of Oklahoma were used to develop a set of flood-frequency equations for urban areas of Oklahoma. Equations are presented for estimating the 2-, 5-, 10-, 25-, 50-, and 100-year flood-peak discharges for basins of 0.5 to 100 square miles. Flood-frequency data for urban areas in Oklahoma are virtually nonexistent; therefore, the accuracy of the urban equations cannot be determined. The general form of the equations could be used in an area outside Oklahoma where the assumptions can be accepted. (Knapp-USGS)
W74-11998

HYDROLOGIC DATA FOR COW BAYOU BRAZOS RIVER BASIN TEXAS, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-11999

4B. Groundwater Management

HYDROGEOLOGY OF THE USSR. VOLUME 4: VORONEZH, KURSK, BELGOROD, BRYANSK, ORLOV, LIPETSK, AND TAMBOV OBLASTS (GIDROGEOLOGIYA SSSR. TOM IV. VORONEZHSKAYA, KURSKAYA, BELGORODSKAYA, BRYANSKAYA, ORLOVSKAYA, LIPETSKAYA, TAMBOVSKAYA OBLASTI).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, Sidorenko, A. V., editor-in-chief, 1972. 496 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater resources, *Aquifers, *Engineering geology, Geomorphology, Structural geology, Geologic mapping, Stratigraphy, Geologic time, Water types, Mineral water, Industrial water, Water utilization, Water supply, Water conservation, Water analysis, Boreholes, Forecasting, Zoning.
Identifiers: *USSR, Voronezh oblast, Kursk oblast, Belgorod oblast, Bryansk oblast, Orlov oblast, Lipetsk oblast, Tambov oblast, Tectonics.

Volume 4 in the series 'Hydrogeology of the USSR' contains a detailed hydrogeologic and engineering-geologic description of the Voronezh, Kursk, Bryansk, Orlov, Lipetsk, Tambov, and Belgorod Oblasts. A history of areal hydrogeologic and engineering-geologic investigations, and basic factors influencing formation and distribution of groundwater are reviewed. Aquifers and problems of their regime, formation, and zonality are described, and the role of groundwater in the national economy of the Oblasts is examined. Ways are outlined for solving problems of water supply of large industrial centers and mining enterprises, and projections are made of groundwater use for 1980 and the year 2000. Tabulated results of groundwater chemical analyses and a catalog of boreholes plotted on a hydrogeologic map of Mesozoic-Cenozoic, Paleozoic, and Archean-Proterozoic deposits are appended. (Josefson-USGS)
W74-11453

HYDROGEOLOGY OF THE USSR. VOLUME 17: KEMEROVO OBLAST AND ALTAY TERRITORY (GIDROGEOLOGIYA SSSR. TOM XVII. KEMEROVSKAYA OBLAST' I ALTAYSKIY KRAY).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, Sidorenko, A. V., editor-in-chief, 1972. 399 p.

Descriptors: *Hydrogeology, *Groundwater, *Groundwater basins, *Aquifers, *Engineering geology, Geomorphology, Structural geology, Geologic mapping, Stratigraphy, Water types, Connate water, Confined water, Mineral water, Industrial water, Water utilization, Water supply, Water conservation, Mineralogy, Zoning, History.
Identifiers: *USSR, Kemerovo oblast, Altay territory, Tectonics.

Volume 17 in the series 'Hydrogeology of the USSR' describes hydrogeologic and engineering-geologic conditions in the Kemerovo Oblast and Altay Territory, covering 357,000 sq km. A history of areal hydrogeologic and engineering-geologic investigations, and natural factors influencing groundwater formation are reviewed. Use of fresh groundwater in the national economy, hydrogeology of mineral deposits, and hydrogeologic and engineering-geologic zoning of the area are examined. A hydrogeologic map of the Kemerovo Oblast and Altay Territory at a scale 1:1,000,000, and an engineering-geologic map of the Oblast and Territory at a scale of 1:2,500,000 are appended. (Josefson-USGS)
W74-11454

HYDROGEOLOGY OF THE USSR. VOLUME 26. SOVIET NORTH EAST (GIDROGEOLOGIYA SSSR. TOM XXVI. SEVERO-VOSTOK).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
Izdatel'stvo 'Nedra', Moscow, Sidorenko, A. V., editor-in-chief, 1972. 296 p.

Descriptors: *Hydrogeology, *Groundwater, *Aquifers, *Permafrost, *Engineering geology, Geomorphology, Structural geology, Geologic mapping, Geologic time, Water types, Thermal water, Mineral water, Water utilization, Water supply, Water conservation, Mineralogy, Placer mining, Coals, Zoning, History.
Identifiers: *USSR, Soviet North East, Magadan oblast, Kamchatka oblast, Khabarovsk territory, Taliks, Ice lenses, Tectonics.

The Soviet North East, described in Volume 26 in the series 'Hydrogeology of the USSR' includes the Magadan Oblast, the northern part of Kamchatka Oblast (Koryak National District), and the northeastern part of Khabarovsk Territory (Okhotsk Rayon). Physiographic, geologic, permafrost, and hydrogeologic conditions in the area are described, and characteristics of groundwater formation are examined. Attention is focused on problems of formation of taliks and ice lenses and on their role in water resources development. Groundwater use in the national economy, and effect of industrial activities of man on hydrogeologic and permafrost conditions are discussed. A hydrogeologic map of the Soviet North East at a scale of 1:2,500,000 is appended. (Josefson-USGS)
W74-11455

REGIONAL DEVELOPMENT OF GROUNDWATER RESOURCES IN COMBINATION WITH SURFACE WATERS,
Water Resources Board, Reading (England).
R. A. Downing, D. B. Oakes, W. B. Wilkinson, and C. E. Wright.
Journal of Hydrology, Vol 22, No 1/2, p 155-177, June 1974. 7 fig, 22 ref.

Descriptors: *Conjunctive use, *Water resources development, *Regional development, Optimum development plans, Aquifers, Groundwater, Surface waters, Water yield.
Identifiers: *United Kingdom.

As the demand for water in the United Kingdom increases during the latter part of this century, it will be necessary to derive optimum benefits from groundwater storage. This will involve the conjunctive use of surface and groundwater resources to provide water for supply and yet maintain adequate river flows for amenity and other purposes. The investigations necessary before the development of conjunctive use schemes are assessment of yield for surface water and groundwater and evaluation of hydrogeological factors affecting aquifer yield. The value of mathematical models in the design and management stages of such schemes and some of the constraints influencing the regional development of aquifers in the United Kingdom are discussed. (Humphreys-ISWS)
W74-11464

HYDROLOGIC INVESTIGATIONS OF THE GROUNDWATERS OF CENTRAL TEXAS USING U-234/U-238 DISEQUILIBRIUM,
Rice Univ., Houston, Tex. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W74-11465

METHOD OF ADDITIONAL SEEPAGE RESISTANCES--THEORY AND APPLICATION,
Birmingham Univ. (England). Dept. of Civil Engineering.
T. D. Streltsova.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY8, Proceedings Paper 10746, p 1119-1131, August 1974. 7 fig, 28 ref, 2 append.

Descriptors: *Seepage, *Groundwater, *Model studies, *Dewatering, Canal seepage, Groundwater movement, Hydraulics, Flow, Seepage control, Penetration, Drainage, Drawdown, Open channels, Water wells, Well data, Hydrology, Mathematics, Darcy's law, Finite element analysis, Flow resistance, Energy loss, Steady flow, Application methods.
Identifiers: *Seepage resistance, *Partial well penetration, St. Venant principle, Well systems.

The method of additional seepage resistances based on the local consideration of zones of sharp flow deformation caused by partially penetrating boundaries is described. The allowance for the replacements of the additional resistance by an equivalent resistance to a horizontal flow through an extra length has the advantage of simplifying the subsequent calculating procedure. The application is given for the flow into open partially penetrating channels, to multiple well systems of complete or partial penetration, and to a single well of partial penetration. The examples showed the nature of the additional seepage resistances was identical regardless of the type of partial penetrating boundary. (Humphreys-ISWS)
W74-11479

DIGITAL RECORDING OF WATER LEVELS WITH THE AID OF ACOUSTICS AND ITS APPLICATION TO HYDROLOGICAL PUMPING TESTS,
Bundesanstalt fuer Bodenforschung, Hanover (West Germany).
For primary bibliographic entry see Field 7B.
W74-11495

EVALUATION OF THE GROUNDWATER RESOURCE IN THE UPPER SKUNK RIVER BASIN,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-11616

COST AND FEASIBILITY OF STIMULATING TIGHT GAS RESERVOIRS WITH CHEMICAL EXPLOSIVES,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 8H.
W74-11663

REPORTS AVAILABLE IN PLOWSHARE OPEN FILE.
Nevada Operations Office (AEC), Las Vegas.
For primary bibliographic entry see Field 5B.
W74-11671

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED COMANCHE PEAK STEAM ELECTRIC STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-11674

GROUNDWATER OCCURRENCE AND MOVEMENT IN THE ATHOL AREA AND THE NORTHERN RATHDRUM PRAIRIE, NORTHERN IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 2F.
W74-11730

COMPUTER MODEL FOR DETERMINING BANK STORAGE AT HUNGRY HORSE RESERVOIR, NORTHWESTERN MONTANA,
Geological Survey, Washington, D.C.
T. H. Thompson.
Available from Superintendent of Documents, Washington, D.C. 20402, Price $0.65 (paper cover). Professional Paper 833, 1974. 16 p, 7 fig, 4 tab, 8 ref.

Descriptors: *Bank storage, *Reservoirs, *Montana, *Surface-groundwater relationships, *Mathematical models, Water level fluctuations, Water table, Columbia River, Computer programs, *Computer models.
Identifiers: *Hungry Horse Reservoir(MT).

A mathematical model was developed to compute bank storage at Hungry Horse Reservoir in northwestern Montana. The model uses daily reservoir elevations as an input parameter. Monthly accumulated bank-storage volumes were calculated for the period October 1951 through September 1972. An estimated 5.8% of the usable reservoir storage volume would be available from bank storage for at-site power generation and downstream benefits if the reservoir was subjected to a long-term, cyclic drawdown. Several model configurations were evaluated. However, the accuracy of the solution using the recommended configuration is within the accuracy limits of the input parameters. The model sensitivity was evaluated by comparing the results of the model before and after a parameter was changed a fixed percentage while holding the other parameters constant. The model is most sensitive to changes in aquifer width on an annual basis and to changes in the storage coefficient on a seasonal basis. The computer model can be used to compute bank-storage volumes whenever historical or assumed elevations are available for Hungry Horse Reservoir. The parameters can be changed to estimate bank-storage volumes at other reservoirs having similar geologic, physiographic, and hydrologic conditions. (Knapp-USGS)
W74-11732

ELECTRIC-ANALOG SIMULATION NETWORK OF UNCONSOLIDATED AQUIFERS IN THE UPPER WABASH RIVER BASIN, INDIANA,
Geological Survey, Indianapolis, Ind.
J. E. Heisel.
Available from NTIS, Springfield, Va. 22161 as PB-226 227, Price $3.75 printed copy; $2.25 microfiche. Water-Resources Investigations 29-73, September 1973. 26 p, 11 fig, 3 tab, 13 ref.

Descriptors: *Groundwater movement, *Analog models, *Model studies, *Indiana, Glacial drift, Alluvium, Hydrogeology, Surface-groundwater relationships.
Identifiers: *Wabash River basin(IN).

The groundwater budget of the unconsolidated deposits in the upper Wabash River basin was modeled. An electrical-simulation network was used to determine an integrated storage coefficient of 0.003 for the basin. Two practical problems were investigated: a municipal pumping problem and the change in flow regime due to the addition of surface-water reservoirs to the basin. The network is available and can be used to determine the effect on basin hydrology due to local development of the groundwater resource. (Knapp-USGS)
W74-11736

DIGITAL MODEL OF THE OGALLALA AQUIFER OF THE NORTHERN PART OF THE NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2F.
W74-11741

LOW-FLOW CHARACTERISTICS OF SELECTED STREAMS IN THE SABINE RIVER BASIN DOWNSTREAM FROM TOLEDO BEND RESERVOIR,
Geological Survey, Baton Rouge, La.
For primary bibliographic entry see Field 2E.
W74-11743

FEASIBILITY OF DIGITAL WATER-QUALITY MODELING ILLUSTRATED BY APPLICATION AT BARSTOW, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W74-11750

DETECTION OF SUBSURFACE CAVITIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
E. R. Bates.
Available from NTIS, Springfield, Va 22161 as AD-762 538, Price $7.00 printed copy; $2.25 microfiche. Miscellaneous Paper S-73-40, June 1973. 81 p, 27 fig, 28 ref, append.

Descriptors: *Geophysics, *Electrical studies, *Caves, Karst, Seismic studies, Remote sensing, Subsurface investigations, Borehole geophysics, Underground.
Identifiers: *Underground cavities.

Geophysical and remote-sensing methods were applied to the problem of detecting underground cavities. None of the remote-sensing (airborne) methods showed any promise for detecting specific cavities because their practical and theoretical capabilities of depth penetration and resolution precluded this application. However, they may be useful in selecting areas for more detailed study by other methods. The geophysical methods that showed the most promise were variations of seismic subsurface profiling and various electrical geophysical prospecting methods. Seismic methods were successful only in detecting cavities whose radii equalled the depth of overburden. Self-potential, equipotential, and electrical resistivity surveys all show some success. A new process of data interpretation was developed for one specific electrode configuration. The modified procedure produced excellent results during field tests over known cavities in Indiana and Missouri. Cavities less than 10 ft in diameter and at depths greater than 100 ft were located. (Knapp-USGS)
W74-11756

WELL MEASUREMENTS,
Ministry of Works, Wellington (New Zealand).
N. D. Dench.
In: Geothermal Energy--Review of Research and Development (Earth Sciences Series, No 12, p 85-96): United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France, 1973. 11 fig, 34 fig.

Descriptors: *Geothermal studies, *Wells, *Measurement, Reviews, Instrumentation, Thermal water, Geophysics, Borehole geophysics, Steam.
Identifiers: *Geothermal energy.

Geothermal well fluid measurements are reviewed. The measurements described comprise: reservoir investigation, in particular as to its size, permeability and temperature, and also the fluid composition and pressure; well flow characteristics, specifically temperatures and pressures and the corresponding flow rates of the various constituents (steam, hot water and gas); downhole engineering data, such as casing condition, mineral deposition, or levels of permeability; and miscellaneous observations carried out by the well measurements personnel. (Knapp-USGS)
W74-11760

THE ROLE OF GEOLOGY AND HYDROLOGY IN GEOTHERMAL EXPLORATION,
United Nations, New York. Resources and Transport Div.
J. R. McNitt.
In: Geothermal Energy--Review of Research and Development (Earth Sciences Series, No 12, p33-40): United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France, 1973. 45 ref.

Descriptors: *Hydrology, *Geology, *Hydrogeology, *Geothermal studies, Reviews, Thermal water, Exploration, Surveys, Investigations, Geophysics.
Identifiers: *Geothermal energy.

The application of the sciences of geology and hydrology to the exploration of geothermal resources, and in particular, how geology is interrelated to the more specialized disciplines of geochemistry and geophysics are reviewed. No single criterion or 'rule' can be followed in selected promising thermal areas for further prospecting. Each area must be considered individually, and valid conclusions can be reached only be evaluating all relevant data within the framework of the total geologic environment. Of all geophysical methods used for thermal prospecting, the most successful appears to be deep resistivity. These surveys should be designed to obtain information from about 1,000 m, which is a reasonable depth from which to expect production. The number of wells required to explore any one prospect will depend on the number of drilling targets available and the size of these targets, as defined by detailed surveys. The depth of exploratory wells, as their location, must be determined on the basis of the surface surveys. (Knapp-USGS)
W74-11761

GEOPHYSICAL METHODS IN GEOTHERMAL EXPLORATION,
C. J. Banwell.
In: Geothermal Energy--Review of Research and Development (Earth Sciences Series, No 12, p 41-48): United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France, 1973. 11 ref.

Descriptors: *Geophysics, *Geothermal studies, *Thermal water, Thermal power, Exploration, Investigations, Mapping, Reviews.
Identifiers: *Geothermal energy.

The presence of a geothermal field will affect or distort some of the local physical quantities, and geophysical aids have proved to be of considerable value in the detection and interpretation of geothermal fields. Geophysical prospecting may be defined as the art of detecting and interpreting anomalies in the local pattern of certain physical quantities, as measured by suitable sensing equipment and techniques. No single method of survey yields a unique and unambiguous result, and the overall picture of a geothermal field and reservoir is built up by a continuous process of cooperative data synthesis and cross-checks. (Knapp-USGS)
W74-11762

ENCROACHING SALT WATER IN NORTHEAST PALM BEACH COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W74-11779

GEOCHEMICAL METHODS IN GEOTHERMAL EXPLORATION,
Iceland Univ., Reykajavik. Science Inst.
For primary bibliographic entry see Field 2K.
W74-11786

POLLUTED GROUNDWATER: A REVIEW OF THE SIGNIFICANT LITERATURE,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
For primary bibliographic entry see Field 5B.
W74-11800

GROUNDWATER CONTAMINATION IN THE NORTHEAST STATES,
Geraghty and Miller, Inc., Port Washington, N.Y.
For primary bibliographic entry see Field 5B.
W74-11806

PUBLIC GROUNDWATER SUPPLIES IN CRAWFORD COUNTY,
Illinois State Water Survey, Urbana.
D. M. Woller.
Bulletin 60-7, 1974. 8 p, 14 tab.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, Aquifer characteristics, Unconsolidated aquifer, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Shallow wells.
Identifiers: *Crawford County(IL), Dissolved minerals, Public groundwater supplies, Water bearing formations.

All available data are reported on production wells used for public groundwater supplies in Crawford County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Unconsolidated sand and gravel deposits associated with the valleys of the Wabash River and Brushy Creek are tapped as the sources for three water supply systems. Eight wells with depths ranging from 32 to 85 ft have reported yields from 75 to 800 gpm. Analyses of water indicate the iron content ranges from 0.0 to 1.2 mg/l, and the hardness from 129 to 384 mg/l. (Humphreys-ISWS)
W74-11880

PUBLIC GROUNDWATER SUPPLIES IN BROWN COUNTY,
Illinois State Water Survey, Urbana.
D. M. Woller.
Bulletin 60-5, 1974. 4 p, 5 tab.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, Aquifer characteristics, Unconsolidated aquifer, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Shallow wells, Deep wells.
Identifiers: *Brown County(IL), Dissolved minerals, Public groundwater supplies, Water bearing formations.

All available data are reported on production wells used for public groundwater supplies in Bown County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Unconsolidated sand and gravel deposits associated with a narrow bedrock valley tributary to the Illinois River valley are tapped as a source of a municipal water supply. Two wells ranging in depth from 36 to 45 ft have reported yields from 18 to 20 gpm. Their iron content ranges from 0.0 to 0.1 mg/l and the hardness from 397 to 500 mg/l. Consolidated bedrock aquifers, principally the Keokuk-Burlington limestone, are tapped as a source of both private and municipal supplies. One well is 483 ft deep and yields 33 gpm. The iron content ranges from 0.0 to 0.2 mg/l and the hardness from 26 to 40 mg/l. (Humphreys-ISWS)
W74-11881

PUBLIC GROUNDWATER SUPPLIES IN BOONE COUNTY,
Illinois State Water Survey, Urbana.
D. M. Woller, and E. W. Sanderson.
Bulletin 60-6, 1974. 12 p, 2 fig, 13 tab.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, Aquifer characteristics, Unconsolidated aquifer, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Deep wells, Shallow wells.
Identifiers: *Boone County(IL), Dissolved minerals, Public groundwater supplies, Water bearing formations.

All available data are reported on production wells used for public groundwater supplies in Boone County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Unconsolidated sand and gravel deposits are tapped with three wells for municipal water supplies. These wells with depths ranging from 120 to 184 ft have reported yields from 150 to 1,935 gpm. Analyses of water from these wells indicate that the iron content ranges from 0.0 to 0.5 mg/l and the hardness from 292 to 352 mg/l. The underlying bedrock units are also tapped for water supplies. These wells with depths ranging from 610 to 1,861 ft have reported yields from 400 to 1,580 gpm. Analyses of water indicate the iron content ranges from 0.0 to 3.0 mg/l and the hardness from 308 to 588 mg/l. (Humphreys-ISWS)
W74-11882

PUBLIC GROUNDWATER SUPPLIES IN FORD COUNTY,
Illinois State Water Survey, Urbana.
D. M. Woller.
Bulletin 60-8, 1974. 19 p, 33 tab.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, *Aquifer characteristics, Unconsolidated aquifer, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Deep wells, Shallow wells.
Identifiers: *Ford County(IL), Dissolved minerals, Public groundwater supplies.

All available data are reported on production wells used for public groundwater supplies in Ford County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Sand and gravel deposits in the unconsolidated materials above bedrock are tapped as the sources for eight municipal water supplies. Seventeen municipal production and standby wells, ranging in depth from 56 to 340 ft, have reported yields from 74 to 1900 gpm. Analyses of water they produce indicate the iron content ranges from 0.0 to 8.6 mg/l and the hardness from 194 to 785 mg/l. A consolidated bedrock aquifer, principally the Silurian dolomite, is tapped as the primary source for one municipal supply. The three wells, 233 and 357 ft deep, reported yields from 19 to 133 gpm. Analyses of water from these wells indicate the iron content ranges from 0.2 to 1.6 mg/l and the hardness from 544 to 820 mg/l. A description for each production well includes the aquifer tapped, date drilled, depth, driller, legal location, elevation in feet above mean sea level, log, construction features, yield, pumping equipment, and chemical analyses. (Humphreys-ISWS)
W74-11883

PUBLIC GROUNDWATER SUPPLIES IN HARDIN COUNTY,
Illinois State Water Survey, Urbana.
D. M. Woller.
Bulletin 60-10, 1974. 4 p, 5 tab.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, *Aquifer characteristics, Unconsolidated aquifers, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Shallow wells.

Identifiers: *Hardin County(IL), Dissolved minerals, Public groundwater supplies, Water bearing formations.

All available data are reported on production wells used for public groundwater supplies in Hardin County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Unconsolidated sand and gravel deposits associated with the bottomlands of the Ohio River valley are tapped as a source of municipal water supply for the Hardin County Water District. The well is 84.5 ft deep and its reported yield was 65 gpm upon completion. Analyses of water from the well indicate the iron content ranges from 1.6 to 3.1 mg/l and the hardness from 344 to 382 mg/l. A consolidated bedrock aquifer, Mississippian age creviced limestone, was tapped as the primary source of municipal supply for the village of Cave in Rock. The well is 215 ft deep and its reported yield ranges from 92 to 105 gpm. Analyses of water from this well indicate that the iron content ranges from 0.15 to 0.2 mg/l and the hardness from 270 to 307 mg/l. A description for each well includes the aquifer tapped, date drilled, depth, driller, legal location, elevation in feet above mean sea level, log, construction features, yield, pumping equipment, and chemical analyses. (Humphreys-ISWS)
W74-11884

PUBLIC GROUNDWATER SUPPLIES IN KENDALL COUNTY,
Illinois State Water Survey, Urbana.
D. M. Woller, and J. P. Gibb.
Bulletin 60-4, 1974. 16 p, 2 fig, 29 tab.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, Aquifer characteristics, Unconsolidated aquifer, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Shallow wells, Deep wells.
Identifiers: *Kendall County(IL), Dissolved minerals, Public groundwater supplies, Water bearing formations.

All available data are reported on production wells used for public groundwater supplies in Kendall County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Unconsolidated sand and gravel associated with shallow local deposits are tapped for municipal water supplies. Six wells with depths from 18 to 42 ft had reported yields from 150 to 430 gpm. Analyses of water from these wells indicate the iron content ranges from a trace to 0.7 mg/l and the hardness from 339 to 425 mg/l. The underlying bedrock units are tapped with 12 wells for six water supplies. These wells with depths ranging from 120 to 1,396 ft deep have reported yields from 10 to 1,280 gpm. Analyses of water from these wells indicate the iron content ranges from 0.0 to 2.6 mg/l and the hardness from 224 to 357 mg/l. (Humphreys-ISWS)
W74-11885

PUBLIC GROUNDWATER SUPPLIES IN EDGAR COUNTY,
Illinois State Water Survey, Urbana.
D. M. Woller.
Bulletin 60-9, 1974. 10 p, 19 tab.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, *Aquifer characteristics, Unconsolidated aquifer, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Shallow wells.
Identifiers: *Edgar County(IL), Dissolved minerals, Public groundwater supplies.

All available data are reported on production wells used for public groundwater supplies in Edgar County, Illinois. The definition of public water supply as contained in the Environmental protection Act of 1970 was used to determine those water systems and wells to be included. Sand and gravel deposits in the unconsolidated materials above bedrock are tapped as the sources for seven municipal water supplies. Fourteen municipal production and standby wells with depths ranging from 38 to 165 ft have reported yields with from 23 to 348 gpm. Analyses of water they produce indicate that the iron content ranges from 0.0 to 8.2 mg/l and the hardness from 236 to 396 mg/l. The upper-bedrock units of Pennsylvanian age are tapped by one well 165 ft deep. No yield data are available. An analysis of water from this well indicated that the iron content is 2.5 mg/l and the hardness is 271 mg/l. A description for each well includes the aquifer tapped, date drilled, depth, driller, legal location, elevation in feet above mean sea level, log, construction features, yield, pumping equipment, and chemical analyses. (Humphreys-ISWS)
W74-11886

PUBLIC GROUNDWATER SUPPLIES IN ALEXANDER COUNTY,
Illinois State Water Survey, Urbana.
D. M. Woller.
Bulletin 60-2, 1973. 4 p, 6 tab.

Descriptors: *Water supply, *Illinois, *Groundwater resources, *Well data, Aquifer characteristics, Unconsolidated aquifer, Gravels, Sand aquifers, Groundwater, Groundwater availability, Hydrology, Hydrogeology, Water resources, Water quality, Water wells, Municipal water, Water yield, Water properties, Hardness(Water), Chemical properties, Shallow wells, Deep wells.
Identifiers: *Alexander County(IL), Dissolved minerals, Public groundwater supplies, Water bearing formations.

All available data are reported on production wells used for public groundwater supplies in Alexander County, Illinois. The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Unconsolidated sand and gravel deposits associated with the bottomlands of the Mississippi and Cache River Valleys are tapped as sources of municipal water supplies. Two wells, 108 and 171 ft deep, have reported yields greater than 100 gpm. Analyses of water from these wells indicate the iron content ranges from 0.7 to 8.0 mg/l and the hardness from 371 to 420 mg/l. A consolidated bedrock aquifer, creviced limestone, is tapped as the primary source for one municipal supply. The well is 300 ft deep and is pumped at 100 gpm. The iron content of water from this well ranges from 0.0 to 0.4 mg/l and the hardness from 308 to 352 mg/l. (Humphreys-ISWS)
W74-11887

THE USES OF GEOPHYSICAL METHODS IN HYDROGEOLOGICAL INVESTIGATIONS IN ISRAEL,
Geological Survey of Israel, Jerusalem.
For primary bibliographic entry see Field 2F.
W74-11906

HYDROGEOLOGICAL MAPS OF KOREA, 2. UPPER JINWI RIVER BASIN, (IN KOREAN),
Korea Geological and Mineral Inst., Seoul.
For primary bibliographic entry see Field 7C.
W74-11908

A METHOD FOR INTEGRATING SURFACE AND GROUND WATER USE IN HUMID REGIONS,
Pennsylvania State Univ., University Park.
For primary bibliographic entry see Field 5F.
W74-11964

ENERGY--A SPECIAL BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-11966

ENERGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-11967

SELECTED HYDROLOGIC DATA IN THE UPPER COLORADO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-11979

GEOLOGY AND GROUNDWATER FOR LAND-USE PLANNING IN THE EAGLE RIVER-CHUGIAK AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
C. Zenone, H. R. Schmoll, and E. Dobrovolny.
Open-file Report 74-57, 1974. 25 p, 9 fig, 1 plate, 4 tab, 15 ref, append.

Descriptors: *Hydrogeology, *Water resources, *Alaska, Groundwater, Alluvium, Aquifers, Water yield, Data collections, Hydrologic data, Geologic mapping, Water demand.
Identifiers: *Anchorage(AK).

The geology and groundwater resources of the Eagle River-Chugiak area, Alaska, are described. The study area lies mostly within the Cook Inlet-Susitna Lowland and consists of low hills and intervening channels, hummocky ridges, sloping alluvial fans, and low-lying tidal flats that border Knik Arm. The eastern part of the area lies on the steep slopes of the Chugach Mountains. Drainage is generally to the west and northwest, except that locally the slopes drain southwesterly to the Eagle River, the major stream of the area. Limited amounts of groundwater can be recovered from the bedrock in the Eagle River-Chugiak area, particularly where the rock is fractured and weathered. Greater success in locating larger amounts of groundwater can be expected in the more permeable and more porous unconsolidated surficial deposits. The types of geologic materials from which groundwater can be recovered in adequate quantities for even single-family use are limited in number and areal extent. However, two alluvial-fan areas--at Meadow Creek and at Peters Creek--are potential sources for larger, communitywide water supplies. A yield of 326 gpm was reported for one well on the Meadow Creek fan. The chemical quality of groundwater in the Eagle River-Chugiak area is acceptable for domestic use. A potential for bacteriological pollution of the water exists, however, in relatively high-density residential area of Eagle River, where individual shallow wells and septic tanks are used. Part of the community is now served by a sewage-collection system and treatment facility. (Knapp-USGS)
W74-11982

WATER RESOURCES OF THE LARAMIE, SHIRLEY, HANNA BASINS AND ADJACENT AREAS, SOUTHEASTERN WYOMING,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-11983

GROUNDWATER AND GEOLOGY OF BARAGA COUNTY, MICHIGAN,
Geological Survey, Lansing, Mich.
C. J. Doonan, and J. R. Byerlay.
Michigan Geological Survey Water Investigation 11, 1973. 26 p, 2 fig, 2 plate, 8 tab, 12 ref.

Descriptors: *Groundwater, *Water resources, *Michigan, Hydrogeology, Data collections, Hydrologic data, Municipal water, Domestic water, Water yield, Water quality.
Identifiers: *Baraga County(MI).

Most wells in Baraga County, Michigan, obtain water from beds of sand and gravel in morainal and lakebed deposits or from the Jacobsville Sandstone. Yields of wells range from a few gpm to as much as 115 gpm, but most wells probably yield less than 10 gpm. Large areas where igneous and metamorphic rocks crop out or are covered only by thin drift are unfavorable for obtaining enough groundwater for even a domestic supply. Quality of water from most wells is satisfactory, although most water supplies are hard and some are high in iron content. Some of the deeper wells in the Jacobsville Sandstone may yield salty water. Most large public water supplies are obtained from Lake Superior, but some smaller supplies are obtained from wells and springs. (Knapp-USGS)
W74-11987

HYDROLOGY OF THE COLUMBIA (PLEISTOCENE) DEPOSITS OF DELAWARE: AN APPRAISAL OF A REGIONAL WATER-TABLE AQUIFER,
Geological Survey, Dover, Del.
R. H. Johnston.
Delaware Geological Survey Bulletin No 14, June 1973. 78 p, 15 fig, 7 tab, 46 ref.

Descriptors: *Hydrogeology, *Aquifers, *Delaware, Water yield, Transmissivity, Data collections, *Hydrologic data, Surface-groundwater relationships, Aquifer characteristics, Coastal plains.
Identifiers: *Columbia Aquifer(DE).

The Columbia (Pleistocene) deposits of Delaware form a regional water-table aquifer, which supplies about half the groundwater pumped in the State. The aquifer is composed principally of sands which occur as channel fillings in northern Delaware and as a broad sheet across central and southern Delaware. The saturated thickness of the aquifer ranges from a few feet in many parts of northern Delaware to more than 180 feet in southern Delaware. The average transmissivity in central and southern Delaware is about 7,000 sq ft/day, and the average hydraulic conductivity is about 90 ft/day. Six areas of above-average transmissivity have been identified in central and southern Delaware, where transmissivity ranges from 10,000 sq ft/day to 22,000 sq ft/day. The small Coastal Plain streams of central and southern Delaware are incised into the upper part of the Columbia deposits and derive about three-quarters of their flow from groundwater discharge. Present pumpage (33 mgd) is small compared to the natural discharge from the aquifer. The specific capacity of large-diameter wells ranges from about 5 to 100 gpm/ft and averages 28 gpm/ft. Water from the Columbia deposits is generally soft, slightly acidic, and characterized by low dissolved-solid content. (Knapp-USGS)
W74-11993

GROUNDWATER RESOURCES OF BRAZOS AND BURLESON COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
C. R. Follett.
Texas Water Development Board Report 185, June 1974. 194 p, 27 fig, 17 tab, 34 ref.

Descriptors: *Water resources, *Groundwater, *Aquifers, *Texas, *Data collections, Hydrologic data, Hydrogeology, Water yield, Water quality, Water wells.
Identifiers: *Brazos County(TX), *Burleson County(TX).

The geologic formations that yield large quantities of water to wells in Brazos and Burleson Counties, Texas are the Wilcox Group, Carrizo Sand, Queen City Sand, Sparta Sand, terrace deposits, and flood-plain alluvium. The Carrizo Sand and the underlying Wilcox Group are in hydraulic continuity and function as a single aquifer. About 34 mgd of groundwater was used for all purposes in 1969. Of this amount, 66% was used for irrigation, 32% for public supply, and 2% for industrial, rural-domestic, and livestock needs. Use of groundwater for public supply increased from a total of 1.3 mgd in 1940 to 11 mgd in 1969. Large quantities of groundwater are available for development. About 290 million acre-feet of fresh to slightly saline water is in transient storage in the principal upland aquifers and flood-plain alluvium. About 220 million acre-feet is stored in the Carrizo-Wilcox aquifer. The total quantity of water available from the principal aquifers without depleting the supply is about 64,000 acre-feet per year or 57 mgd. The Carrizo-Wilcox aquifer, Queen City Sand, and Sparta Sand contain water that is generally suitable for public supply, many industrial uses, and irrigation. (Knapp-USGS)
W74-11994

APPLICATION OF SURFACE GEOPHYSICS TO GROUNDWATER INVESTIGATIONS,
Geological Survey, Washington, D.C.
A. A. R. Zohdy, G. P. Eaton, and D. R. Mabey.
Available from GPO, Washington, DC 20402, Price $1.90 (paper copy). Techniques of Water-Resources Investigations, Book 2, Chapter D1, 1974. 116 p, 76 fig, 156 ref.

Descriptors: *Geophysics, *Electrical studies, *Gravity studies, *Magnetic studies, *Seismic studies, Subsurface investigations, Hydrogeology, Exploration, Subsurface mapping, Surveys, Instrumentation, Equipment.

This manual reviews the standard methods of surface geophysics applicable to groundwater investigations. It covers electrical methods, seismic and gravity methods, and magnetic methods. The general physical principles underlying each method and its capabilities and limitations are described. Possibilities for nonuniqueness of interpretation of geophysical results are noted. Examples of actual use of the methods are given to illustrate applications and interpretation in selected geohydrologic environments. The objective of the manual is to provide the hydrogeologist with a sufficient understanding of the capabilities, limitations, and relative cost of geophysical methods to make sound decisions as to when use of these methods is desirable. The manual also provides enough information for the hydrogeologist to work with a geophysicist in designing geophysical surveys that differentiate significant hydrogeologic changes. (Knapp-USGS)
W74-11996

4C. Effects On Water Of Man'S Non-Water Activities

THE USE OF RADAR IN URBAN HYDROLOGY,
McGill Univ., Montreal (Quebec). Stormy Weather Group.
For primary bibliographic entry see Field 2E.
W74-11468

EXTENT AND DEVELOPMENT OF URBAN FLOOD PLAINS,
Geological Survey, Reston, Va.
W. J. Schneider, and J. E. Goddard.
Circular 601-J, 1974. 14 p, 8 fig, 3 tab, 1 ref. OWRR C-4048 (9009) (22).

Descriptors: *Flood plains, *Urbanization, *Floods, Urban hydrology, Flood profiles, Flood stages.
Identifiers: Urban flood plains.

The amount of urban area in flood plains of 26 urbanized areas in the United States ranges from 2.4% for Spokane, Wash., to 81% for Monroe, La. The median value is 10.5%, and the weighted average is 16.2%. The amount of development on these flood plains also varies widely, from 11.3% for Lorain-Elyria, Ohio, to 97% for Great Falls, Mont. The median value is 57%, and the weighted average is 52.8%. Attempts to correlate either the extent of urban area in flood plain or amount of development with three readily available indices--depth of flooding, precipitation, and physiography--showed no strong relationships. Some correlation was found between the extent of urban area in flood plain and index of depth of flooding. (Knapp-USGS)
W74-11492

CHARACTER AND SIGNIFICANCE OF HIGHWAY RUNOFF WATERS--A PRELIMINARY APPRAISAL,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. O. Sylvester, and F. B. DeWalle.
Available from NTIS, Springfield, Va. 22161 as PB-220 083 Price $5.45 printed copy; $2.25 microfiche. Final Contract Report for Washington Department of Highways and Federal Highway Administration, December 1972. 97 p, 14 fig, 28 tab, 82 ref, 3 append.

Descriptors: *Water quality, *Washington, *Roads, *Storm runoff, Urban hydrology, Water pollution sources, Highway effects, Path of pollutants, Heavy metals, Oily water, Highways.
Identifiers: Seattle(WA).

The character and significance of highway runoff were studied in Washington. Literature was reviewed and observations were made on a limited amount of field sampling done on the runoff and particulate emissions from the State Highway 520 bridge over Portage Bay in Seattle. While highway runoff contains significant quantities of oils, heavy metals, dust and dirt, substances from vehicle wear, litter, and algal nutrients, it does not appear to be very much different in general quality from urban area runoff. Preliminary results indicate that heavy metal concentrations may be higher in highway runoff. A major portion of vehicle emissions are apparently carried off the road surface by air currents and by splashing. The large sized particulates settle close to the road surface. If they settle on a soil surface, it is likely that most of them are retained in the soil and do not appear in the right-of-way runoff. A significant portion of the oils, heavy metals and nutrients are absorbed to particulates and other solids. Deicing salts should have no significant effect on either Lake Washington or Echo Lake and bridge runoff into Lake Washington is insignificant as compared to urban area drainage to the Lake. (Knapp-USGS)
W74-11775

STUDIES ON MODELING OF URBAN STORM WATER RUNOFF--ON THE RELATION BETWEEN THE COMPOSITION OF BASIN MODEL AND THE EQUIVALENT ROUGHNESS,
For primary bibliographic entry see Field 5B.
W74-11855

THE ILLINOIS URBAN DRAINAGE AREA SIMULATOR, ILLUDAS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5B.
W74-11889

URBAN RUNOFF BY LINEARIZED SUB-HYDROGRAPHIC METHOD,
Dalton-Dalton-Little-Newport, Inc., Cleveland, Ohio.
For primary bibliographic entry see Field 2A.
W74-11890

JOINT CONSTRUCTION SEDIMENT CONTROL PROJECT,
Hittman Associates, Inc., Columbia, Md.; and Maryland Water Resources Commission, Annapolis.
For primary bibliographic entry see Field 4D.
W74-11923

ASSESSMENT OF THE ECOLOGICAL CONSEQUENCES OF HERBICIDE USE ALONG TRANSMISSION LINE RIGHTS-OF-WAY AND RECOMMENDATION FOR SUCH USE,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5C.
W74-11977

AN APPROACH TO ESTIMATING FLOOD FREQUENCY FOR URBAN AREAS IN OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 4A.
W74-11998

4D. Watershed Protection

UNIT HYDROGRAPHS FOR CATCHMENTS OF DIFFERENT SIZES AND DISSIMILAR REGIONS,
Massey Univ., Palmerston North (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W74-11466

INSTRUMENTATION CONSIDERATIONS FOR STUDIES OF QUALITY OF RUNOFF FROM SMALL AGRICULTURAL WATERSHEDS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 7B.
W74-11545

MEASUREMENT AND SIGNIFICANCE OF ELECTRICAL CONDUCTIVITY IN SMALL MOUNTAIN STREAMS,
Swiss Forest Research Inst., Birmensdorf.
For primary bibliographic entry see Field 7B.
W74-11547

PROCEEDINGS: PLANNING AND DESIGN FOR URBAN RUNOFF AND SEDIMENT MANAGEMENT.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-225 274, $4.00 in paper copy, $2.25 in microfiche. A Two Day Short Course. April 10-11, 1973. University of Kentucky, Lexington. Edited by C. T. Haan and B. J. Barfield, University of Kentucky, Lexington, UKY-TR72-73-CEEDS, July, 1973. 29 p, 5 fig, 3 tab, 11 ref.

Descriptors: *Sediment control, *Planning, *Runoff, Channel erosion, Sediment-water interfaces, Soil erosion, Construction, Urbanization, Surface runoff, Drainage systems, Drainage.
Identifiers: Impact zoning, *Impact of construction process, HUD guidelines.

The development of agricultural, forest, or idle land for urban needs greatly increases quantities of runoff and frequency of flooding. These increased runoff flows exceed the capacity of existing channels not only to carry the water, but to resist the erosive power of the water, resulting in stream channel erosion. During the construction phase of development, the sediment production from an area can increase by more than 100 percent. The five papers contained in this proceedings discuss available techniques for reducing these problems, including the utility of impact zoning, HUD runoff and sediment management control guidelines, basic storm drainage system design, urban storm runoff controls, and sediment control principles and methods. The papers are all directed toward preventive methods of urban runoff and sedimentation in areas undergoing development, rather than corrective procedures for already urbanized areas. (Hoffman-North Carolina)
W74-11678

SURVEY OF ECONOMIC-ECOLOGIC IMPACTS OF SMALL WATERSHED DEVELOPMENT,
Georgia Univ., Athens. Inst. of Natural Resources.
For primary bibliographic entry see Field 6B.
W74-11680

JOINT CONSTRUCTION SEDIMENT CONTROL PROJECT,
Hittman Associates, Inc., Columbia, Md.; and Maryland Water Resources Commission, Annapolis.
B. C. Becker, D. B. Emerson, and M. A. Nawrocki.
Copy available from GPO Sup Doc as EP1.23:660/2-73-035, $2.00; microfiche from NTIS, Springfield, Va 22161 as PB-235 634, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-73-035, April 1974. 167 p, 20 fig, 8 tab, 3 ref, 6 append. EPA Program Element 1B2042. 15030 FMZ.

Descriptors: *Aquatic environment, Construction, *Demonstration watersheds, *Storm water, *Erosion control, Rainfall-runoff relationship, *Sedimentation, *Urbanization, Biology, Channel morphology, Control, Costs, Dams, Ecology, Forebays, Gaging stations, Lentic environment, Lotic environment, Mathematical models, Maintenance, Monitoring, Peak discharge, Ponds, Revegetation, Runoff, Suspended load, Trees, Turbidity, Utilities, Water quality, Weirs, *Maryland.
Identifiers: *Guidelines, *Columbia(MD), Grade control, Recycled glass, Recycled sediment, Return frequency, Sediment basins, Site evaluation, Soil loss surveys, Woodland development.

During the period of this demonstration, a natural and agricultural region is being converted to an urban community. This project consists of (1) the implementation, demonstration, and evaluation of erosion control practices; (2) the construction, operation, and demonstration of the use of a stormwater retention pond for the control of stormwater pollution; and (3) the construction, operation, and maintenance of methods for handling, drying, conditioning, and disposing of sediment. In addition, a gaging and sampling program was conducted to determine the effects of urbanization on the hydrology and water quality of natural areas. This project was conducted in the Village of Long Reach, Columbia, Maryland. (EPA)
W74-11923

SEEPAGE IN MISSISSIPPI RIVER BANKS: REPORT 1, ANALYSIS OF TRANSIENT SEEPAGE USING A VISCOUS-FLOW MODEL AND THE FINITE DIFFERENCE AND FINITE ELEMENT METHODS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 4A.
W74-11989

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

A DIVERSITY INDICES COMPUTER PROGRAM FOR USE IN AQUATIC SYSTEMS EVALUATION,
West Virginia Univ., Morgantown. Water Research Inst.
For primary bibliographic entry see Field 7C.
W74-11463

MERCURY IN STRIPED BASS AND BLUEFISH,
New York Ocean Science Lab., Montauk.
J. E. Alexander, J. Foehrenbach, S. Fisher, and D. Sullivan.
New York Fish and Game Journal, Vol 20, No 2, p 147-151, 1973. 3 fig, 8 ref.

Descriptors: *Mercury, *Striped basses, Absorption, Age, Analytical techniques, Bioassay, Methodology, Spectrophotometry, Heavy metals, Water pollution effects, *Pollutant identification, *New York.
Identifiers: *Bluefish, Montauk Point(New York), Morone saxatilis, Pomatomus saltatrix, Methyl mercury, Long Island.

Bluefish and striped bass taken in the vicinity of Montauk Point on Long Island were analyzed for mercury content. In both species, there was a correlation between mercury and weight. Bluefish weighing less than 2.4 kg had concentrations of mercury below 0.5 mg/kg, while in those between 2.4 and 5.6 kg the concentrations fluctuated above and below that level. All fish weighing more than 5.6 kg contained mercury in excess of 0.5 mg/kg. The corresponding weight categories for striped bass were less than 3.2 kg; between 3.2 and 5.7 kg, and more than 5.7 kg, respectively. (Katz)
W74-11488

THE MEASUREMENT OF MEAN TEMPERATURE ON A REACTION VELOCITY BASIS AND ITS APPLICATION TO HYDROLOGY,
Baden Wuerttemberg Hydrological Service, Karlsruhe (West Germany).
For primary bibliographic entry see Field 7B.
W74-11539

DETERMINATION OF THE BOD5 IN RUNNING WATERS BY MEANS OF BIOLOGICAL WATER ANALYSIS,
Rheinland-Pfalz, Hydrological Service, Mainz (West Germany).
E. Hantge.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 582-587, 1973. 5 ref.

Descriptors: *Biochemical oxygen demand, *Monitoring, *Water analysis, Water pollution control, Bioindicators, Water quality control, International hydrological decade, Pollutant identification.
Identifiers: *Germany.

Control of the discharge of organic oxygen-consuming substances into the rivers and canals of Germany is one of the main problems in keeping these waters clear. The method of determining the BOD content from the biological state allows the amount of pollution to be determined. In controlling the waters of Rheinland-Pfalz, the usefulness of this method has been proved repeatedly. In some cases it was found that the quantity of pollution in a river or canal, measured as BOD content, could only be decided from determination of the biological state, and these measurements were em-

ployed for management decisions. Examples are quoted from the practice of the Rheinland-Pfalz water supply system. (See also W74-11493) (Knapp-USGS)
W74-11546

MEASUREMENT AND SIGNIFICANCE OF ELECTRICAL CONDUCTIVITY IN SMALL MOUNTAIN STREAMS,
Swiss Forest Research Inst., Birmensdorf.
For primary bibliographic entry see Field 7B.
W74-11547

PRACTICAL EXPERIENCE WITH DEVICES TO MEASURE O2 CONTENT, TURBIDITY, SOLID MATTER CONTENT AND ELECTRICAL CONDUCTIVITY USED FOR MONITORING WATER QUALITY IN RIVERS,
Emschergenossenschaft, Essen (West Germany).
F. Malz, M. Schniewind, and R. Krone.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 596-607, 1973. 13 fig.

Descriptors: *Monitoring, *Water quality, Water pollution control, Rivers, Instrumentation, *Dissolved oxygen, Conductivity, Electrical conductance, Salts, Industrial wastes, *Turbidity, Tracers, Flow measurement, Data collections, International hydrological decade, Suspended solids, Pollutant identification.
Identifiers: *Germany.

Automatic water quality stations are in use in Germany. Practical experience with O2-electrodes is described and the measurement of turbidity and solid matter are discussed. The measurement of conductivity is important for control of salt load, control of industrial waste, and observation of salts as tracers for flow measurement. (See also W74-11493) (Knapp-USGS)
W74-11548

THE COLORIMETRIC FRONT-END SENSORS IN AUTOMATIC SURVEILLANCE OF WATER QUALITY,
Automated Environmental Systems, Inc., Woodbury, N.Y.
S. M. Zand.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 608-612, 1973. 1 fig, 1 ref.

Descriptors: *Monitoring, *Water quality, *Automation, *Colorimetry, Chemical analysis, Water analysis, Instrumentation, Data collections, Sampling, International hydrological decade, Pollutant identification.

Instrumentation systems used for continuous, unattended, surveillance of water quality consist of front-end sensores, signal conditioners, data transmitters, data storage and retrieval components, and data conditioners. The characteristics of the front-end sensors may also require sample conditioners. The front-end sensors and sample conditioners are often the weakest components of the overall instrumentation system. The lack of compatible front-end sensors is more pronounced when data are utilized in system automation or process control. Colorimetric modules are reliable and are the recommended type of sensor. For the optimum performance of the continuous, unattended colorimetric module in many applications an equally automatic filtration system is a necessity. Techniques are suggested for obtaining over-all system compatibility. (See also W74-11493) (Knapp-USGS)
W74-11549

TEMPERATURE MEASUREMENTS OF WATER SURFACES USING INFRA-RED RADIATION THERMOMETERS,
Deutscher Wetterdienst, Hohenpeissenberg (West Germany).
For primary bibliographic entry see Field 7B.
W74-11552

WATER-QUALITY MONITORING AND DATA TRANSMISSION,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11556

OREGON'S ESTUARIES: DESCRIPTION AND INFORMATION SOURCES FOR OREGON'S ESTUARIES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 2L.
W74-11575

A MULTISOURCE ATMOSPHERIC TRANSPORT MODEL FOR DEPOSITION OF TRACE CONTAMINANTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11651

SIMPLIFIED ATOMIC ABSORPTION DETERMINATION OF STABLE STRONTIUM IN MILK AND HAY: A COMPARISON OF METHODS AND STEPWISE PROCEDURE,
Environmental Protection Agency, Las Vegas, Nev. Monitoring Systems Research and Development Lab.
J. Barth, and B. H. Bruckner.
Available from Government Printing Office, Washington, D.C., $0.70/copy. Report No EPA-680/4-73-002, February 1974. 30 p, 1 fig, 6 tab, 6 ref, append.

Descriptors: *Strontium, *Radioactivity, Monitoring, Assessment, *Assay, Absorption, *Milk, *Hay, Alfalfa, Stable isotopes, Research and development, Analytical techniques, Chemical analysis, *Testing procedures, *Pollutant identification.
Identifiers: Quantitative analysis.

An evaluation is presented of a highly simplified atomic absorption procedure for the determination of stable strontium in fluid milk, milk powder, and alfalfa. A statistical comparison is made between the atomic absorption method of additions and the standard curve method. A difference between the methods was not detected. A suggested stepwise procedure is given. (Houser-ORNL)
W74-11652

ENVIRONMENTAL RADIATION DOSE CRITERIA AND ASSESSMENT: PATHWAY MODELING AND SURVEILLANCE,
Brookhaven National Lab., Upton, N.Y.
For primary bibliographic entry see Field 5B.
W74-11653

USE OF RIVERS TO PREDICT ACCUMULATION IN SEDIMENT OF RADIO-NUCLIDES DISCHARGED FROM NUCLEAR POWER STATIONS,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
For primary bibliographic entry see Field 5B.
W74-11654

ENVIRONMENTAL MONITORING REPORT, UNITED STATES ATOMIC ENERGY COMMISSION, OAK RIDGE FACILITIES, CALENDAR YEAR 1972.
Union Carbide Corp., Oak Ridge, Tenn.
For primary bibliographic entry see Field 5B.
W74-11658

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION, OAK RIDGE FACILITIES, CALENDAR YEAR 1971.
Union Carbide Corp., Oak Ridge, Tenn.
For primary bibliographic entry see Field 5B.
W74-11659

ENVIRONMENTAL LEVELS OF RADIOACTIVITY IN THE VICINITY OF THE LAWRENCE LIVERMORE LABORATORY - 1973 ANNUAL REPORT,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5B.
W74-11660

ENVIRONMENTAL MONITORING REPORT, UNITED STATES ATOMIC ENERGY COMMISSION, OAK RIDGE FACILITIES, CALENDAR YEAR 1973.
Union Carbide Corp., Oak Ridge, Tenn.
For primary bibliographic entry see Field 5B.
W74-11667

APPLIED HEALTH PHYSICS AND SAFETY ANNUAL REPORT 1971,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11669

THEORETICAL EXPERIMENTAL AND FIELD STUDIES CONCERNING REACTIONS OF RADIOISOTOPES WITH SEDIMENTS AND SUSPENDED PARTICLES OF THE SEA. PART C: APPLICATIONS TO FIELD STUDIES,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco). Oceanographic Museum.
For primary bibliographic entry see Field 5B.
W74-11670

CHLORINATION EXPERIMENTS AT THE JOHN E. AMOS PLANT OF THE APPALACHIAN POWER COMPANY: APRIL 9-10, 1973,
Argonne National Lab., Ill.
J. E. Draley.
Available from NTIS, Springfield, Va 22161 as ANL/ES-23., $4.00 paper copy, $2.25 in microfiche. Report No ANL-ES-23, June 1973. 26 p, 3 fig, 4 tab, 3 ref.

Descriptors: *Chlorine, Environment, *Nuclear powerplant, *Cooling towers, *Cooling water, Water pollution, Water pollution sources, Chlorides, Chlorination, Model testing, Assay, Assessment, *Pollutant identification, *Thermal pollution.

In two special runs, free and total residual chlorine were measured in the circulating-water system of the cooling tower for the Amos Plant Unit 1. For a typical chlorination period, in which the concentration of free chlorine at the condenser was about 0.1 ppm, the total residual-chlorine concentration reached maxima of 0.63 ppm at the condenser discharge and 0.32 ppm in the discharge from the cooling-tower basin. These residual-chlorine levels declined after the addition of chlorine was stopped, but more than 2 hr elapsed before the residual chlorine could no longer be detected by the amperometric-titration method. The data for the buildup of residual chlorine at the condenser were fitted with a kinetic expression in which some reduction of chlorine to chloride and some formation of chloramines are assumed. Good fits, with reasonable values of the constants, suggest that the model is correct. Good fits are also reported for an equation to determine decay of combined chlorine. (Houser-ORNL)
W74-11676

THE TRACE ANALYSIS OF WATER FOR SELECTED METALLIC ELEMENTS EMPLOYING SQUAREeWAVE POLAROGRAPHY,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
P. E. Sturrock, and R. J. Carter.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 406, $4.75 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No ERC-0874, July 1974. 130 p, 11 fig, 5 tab, 101 ref. OWRR B-063-GA(1). 14-31-0001-3571.

Descriptors: *Water pollution, *Heavy metals, *Analytic techniques, *Polarographic analysis, Electrodes, Copper, Cadmium, Zinc, Lead, Manganese, Nickel, Iron, Cobalt, *Pollutant identification.
Identifiers: Square-wave polarography, Antimony, Arsenic, Tin, Thallium, Bismuth.

A highly sensitive technique was developed to detect heavy metal pollutants at a cost comparable to that of atomic absorption spectroscopy. The instrument is based on the technique of square-wave polarography and uses a dropping mercury electrode (DME). The limits of detection (as parts per billion) for thirteen elements are: Cu(II), 0.6; Cd(II), 0.6; Zn(II), 0.6; Pb(II), 0.8; Sb(III), 3.7; As(III), 3.7; Mn(II), 4.4; Ni(II), 4.7; Sn(IV), 4.8; Fe(III), 5.6; Tl(I), 6.1; Co(II), 19; Bi(III), 21. In all cases, peak height was a linear function of concentration. The chief disadvantages of the DME are the slow sweep rate required (1-5 mv/sec) and the fact that, in these low concentrations, metal ions are rapidly adsorbed onto glass walls. The use of the hanging mercury drop and the thin mercury film disk electrodes for the analysis of very low concentrations of metals was also investigated. The mercury film rotating disk electrode allowed more rapid, sensitive, and reproducible determinations than did the hanging mercury drop electrode. The procedure employed for detection of low concentrations of metals with the disk electrode required careful control of all instrumental and chemical parameters. In less than 15 minutes analysis time, concentrations below 10-9F could be determined for metals amenable to stripping analysis. Results are reported for the analysis of EPA water reference standards employing the rotating disk and dropping mercury electrodes. The instrumentation and techniques developed are expected to be of considerable value in the analysis of water for heavy metals. The limits of detection are quite low, and the equipment cost is about $3000. (James-Georgia Tech)
W74-11679

ATOMIC ABSORPTION DETERMINATION OF ELEMENTAL MERCURY COLLECTED FROM AMBIENT AIR ON SILVER WOOL,
Environmental Protection Agency, Research Triangle Park, N.C. Quality Assurance and Environmental Monitoring Lab.
S. J. Long, D. R. Scott, and R. J. Thompson.
Analytical Chemistry, Vol 45, No 13, p 2227-2233, November, 1973. 8 tab, 4 fig, 21 ref.

Descriptors: *Mercury, *Analytical techniques, *Air pollution, Testing procedures, Laboratory tests, Absorption, *Heavy metals, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy, Silver wool, Detection limit, Vapor densities.

A flameless atomic absorption system is described to analyze ambient mercury levels from 15 ng/cu m to 10 micro gram/cu m by use of in-series silver wool collectors for 24-hour sampling times. Absorption-time area measurements gave better precision at higher mercury concentrations and calibration curves extending over wider ranges than did absorption-peak height measurements. The mercury vapor calibration curves extend from 0.5 ng to 594 ng mercury and were reproducible to within 11% at 0.5 ng and to within 3%, relative standard deviation, beyond 6 ng. Detection limit was 0.3 ng. The effects of analytical train flow rate, the capacity of the silver wool collectors, and the release temperature for collected mercury were investigated. Ambient levels of dimethylmercury, sulfur dioxide, hydrogen sulfide, and nitrogen dioxide did not seriously interfere with the collection or analysis procedures. (Jernigan-Vanderbilt)
W74-11705

MERCURY CONCENTRATIONS IN FISH, PLANKTON, AND WATER FROM THREE WESTERN ATLANTIC ESTUARIES,
Long Island Univ., Greenvale, N.Y. Graduate Dept. of Marine Science.
G. Cocoros, P. H. Cahn, and W. Siler.
Journal of Fish Biology, Vol 5, p 641-647, 1973. 5 tab, 18 ref.

Descriptors: Fish, Plankton, *Mercury, *Estuaries, *North Carolina, *Maryland, *New York, Distribution, Spectroscopy, *Pollutant identification.
Identifiers: Public health, Atomic absorption spectroscopy.

Twenty fish samples, plankton, and water were obtained from three Western Atlantic estuaries located off the coasts of North Carolina, Maryland, and New York. All fish samples were collected at high tide, at approximately 25C and 31 ppt salinity. Plankton and water samples were taken concurrently at each sample site. Total mercury concentrations were determined by flameless atomic absorption. No dangerously high mercury levels were found in any of the samples. Although there was some indication that the food chain is a likely source of mercury contamination in these fish, since levels in viscera were very much higher than those in the rest of the fish, no evidence of strong food-chain intensification was found. Slow mercury accumulation by the fish was evident. Accumulation of mercury by the fish took place through the digestive system. Fish mercury levels were twice that for the plankton. Phytoplankton had higher mercury levels than zooplankton. (Rowe-Vanderbilt)
W74-11715

AEROSOLS OF LEAD, NICKEL, AND CADMIUM,
Cincinnati Univ., Ohio. Kettering Lab.
S. Horstman, W. Barkley, E. Larson, and E. Bingham.
Archives of Environmental Health, Vol 26, p 75-77, February, 1973. 3 fig, 1 tab, 8 ref. 1-ROI.EC.00385-02.

Descriptors: *Lead, *Cadmium, *Nickel, *Aerosols, Technology, Application methods, Oxidation, Spectrometry, Distribution, *Pollutant identification.
Identifiers: Atomic absorption spectroscopy, Electron photomicrograph.

An aerosol generator for the production of soluble and insoluble nickel, lead, and cadmium aerosols was developed. Solutions of lead chloride or nickel chloride were used to make water soluble aerosols. Aerosols of insoluble nickel oxide and cadmium oxide were produced by aerosolizing aqueous solutions of nickel citrate or cadmium acetate with air and then thermally decomposing the resulting aerosol in a tube furnace heated to 600C. The use of a nebulizer with soluble salts of metals followed by thermal decomposition and oxidation to form the required oxide provided a simple easily controlled and flexible system for the generation of aerosols of metal oxides. These aerosols can be used in the investigation of biological effects of inhalation of metal compounds when certain size and certain concentrations of the aerosol particles are needed. (Rowe-Vanderbilt)
W74-11716

MERCURY CONTENT OF OREGON GROUNDFISH,
Oregon State Univ., Astoria. Dept. of Food Science and Technology.
E. A. Childs, and J. N. Gaffke.
Fishery Bulletin, Vol 71, No 3, p 713-717, July, 1973. 4 fig, 3 tab, 7 ref. NOAA-73110601-9. NOAA-043-158-4.

Descriptors: *Fish, *Mercury, *Oregon, *Spectroscopy, Water pollution, Wastes, Regression analysis, Marine fisheries, Distribution, *Pollutant identification.
Identifiers: Atomic absorption spectroscopy, *Groundfish.

Groundfish were obtained from each of the three major fishing areas off the Oregon Coast. Specimens were immediately dissected, packed in evacuated film, and held at minus 40C until mercury analyses were performed. The amount of mercury in each sample was determined by flameless atomic absorption spectroscopy. Specimens with a mean mercury content less than 0.50 ppm mercury included the rex sole, Dover sole, petrale sole, English sole, sand sole, starry flounder, canary rockfish, flag rockfish, yellowtail rockfish, rougheye rockfish, sablefish, lingcod, Pacific hake and the arrowtooth flounder. Only the mercury content of the spiny dogfish was greater than or equal to 0.50 ppm mercury. No significant relationship was observed between catch location, time of catch, weight and length of specimen, or sex and mercury content found in specimens tested. (Rowe-Vanderbilt)
W74-11717

WHOLE-BODY AND HAIR RETENTION OF CADMIUM IN MICE, INCLUDING AN AUTORADIOGRAPHIC STUDY ON ORGAN DISTRIBUTION,
Karolinska Institute, Stockholm (Sweden). Dept. of Hygiene.
For primary bibliographic entry see Field 5C.
W74-11718

ELECTRON MICROSCOPIC STUDY OF CADMIUM NEPHROTOXICITY IN THE RAT,
Kyushu Univ., Fukuoka (Japan). Dept. of Public Health.
For primary bibliographic entry see Field 5C.
W74-11719

CONSECUTIVE TITRATION OF CALCIUM AND MAGNESIUM IN ETHANOL-WATER MIXTURE,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 2K.
W74-11721

U.S. GEOLOGICAL SURVEY WATER QUALITY PROGRAM, INDIANA DISTRICT,
Geological Survey, Indianapolis, Ind.
W. J. Shampine.
Open-file report, 1974. 26 p, 4 tab, 21 ref.

Descriptors: *Water quality, *Data collections, *Water analysis, *Indiana, Chemical analysis, Solutes, *Pollutant identification, Water pollution effects.

The capabilities of the Indiana district of the U.S. Geological Survey in the field of water-quality investigations are described. The U. S. Geological Survey conducts investigations in cooperation with various Federal, State, or local agencies to define and describe the hydrologic resources of an area. The program at a given time consists of long-term basic-data collection and relatively short-term studies of specific problems or areas. The Survey is currently making three water-quality-oriented interpretive studies. One study, in cooperation with the National Park Service, is

designed to describe the current quality of the water in the newly established Indiana Dunes National Lakeshore between Michigan City and Gary, Indiana. The second study, in cooperation with the city of Indianapolis, is designed to describe the movement and quality of the groundwater near the seven sanitary landfills around Indianapolis. The third study, being done in cooperation with the Soil Conservation Service, is designed to describe the water-quality characteristics of selected areas where the Soil Conservation Service has instigated a watershed management program. (Knapp-USGS)
W74-11734

WASTEWATER SAMPLING AND TESTING INSTRUMENTATION,
Georgia Inst. of Tech., Atlanta.
T. F. Craft, and R. S. Ingols.
Available from NTIS, Springfield, Va 22161 as AD-764 689, Price $3.50 printed copy; $2.25 microfiche. Air Force Weapons Laboratory Kirtland AFB, New Mexico, Technical Report No 73-69, July 1973. 62 p, 9 fig, 1 tab, append. AF Contract F29601-72-C-0149.

Descriptors: *Sampling, *Monitoring, *Waste water(Pollution), *Surveys, Reviews, Equipment, Water analysis, Waste water treatment, Sewage treatment, Military reservations, *Pollutant identification.

Commercially available wastewater sampling and monitoring equipment was surveyed. Information was gathered from vendors and directly from users by a questionnaire. A total oxygen demand analyzer, a fluoride monitor, and a dissolved oxygen analyzer/controller were field tested. Continuous on-line equipment of proven reliability was located and recommended for measuring conductivity, dissolved oxygen, hydraulic loading, ORP, pH, residual chlorine, temperature, and turbidity. Less acceptable continuous, automatic, or semi-automatic devices for measurement of a large number of parameters were found, but are recommended only where manual procedures are not feasible. For some additional measurements only manually performed laboratory methods are available. Various types of samplers are discussed and recommendations are given. (Knapp-USGS)
W74-11754

SIDES: STORET INPUT DATA EDITING SYSTEM,
Environmental Protection Agency, Athens, Ga.
For primary bibliographic entry see Field 7C.
W74-11759

ANALYSIS OF COPROSTANOL, AN INDICATOR OF FECAL CONTAMINATION,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
J. E. Singley, C. J. Kirchmer, and R. Miura.
Copy available from GPO Sup Doc as EP1.23:660/2-74-021, $1.60; microfiche from NTIS, Springfield, Va 22161 as PB-235 491, $2.25. Environmental Protection Agency, Technology Series Report EPA 660/2-74-021, March 1974. 114 p, 41 fig, 34 tab, 77 ref, append. EPA Project 16020 EVG.

Descriptors: Analytical techniques, *Gas chromatography, *Colorimetry, *Coliforms, Sewage bacteria, Water pollution, Chemical analysis, Domestic wastes, *Bioindicators, *Pollutant identification.
Identifiers: *Coprostanol, Sewage treatment efficiency, 2,4-dinitrophenylhydrazine, Sample preservation.

Gas chromatographic (GC) analysis of coprostanol was improved by showing that sample esterification before injection is not necessary. The GC method can detect 20 ng/l, which was estimated to be equivalent to approximately two coliforms per 100 ml. Comparison of coprostanol analyses to total and fecal coliform analyses confirmed the predicted advantages of a chemical method over a biological method. Samples were preserved with concentrated sulfuric acid (1 ml/l sample). The GC method was used in extensive field surveys, degradation studies, and treatment plant efficiency studies. A reasonably good correlation between coprostanol concentration and treatment plant efficiency (BOD, COD, and TOC measurements) was found, but further measurements are needed. A colorimetric method was developed to determine coprostanol at a concentration of 1 ug/l. Analysis time was estimated to be two hours, but several samples were analyzed simultaneously. Colorimetric analyses of coprostanol in field samples gave higher results than GC analyses; high colorimetric results were probably due to the presence of other fecal steroids. (Alford-EPA)
W74-11794

THE ECONOMIC DAMAGES OF AIR POLLUTION,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
T. E. Waddell.
Copy available from GPO Sup Doc as EP1.23:600/5-74-012, $1.95; microfiche from NTIS, Springfield, Va 22161 as PB-235 701, $2.25 MF-PC $3.95. EPA Report, Socioeconomic Studies Series, Report EPA-600/5-74-012, May 1974. 156 p, 5 fig, 22 tab, 5 ref. Program Element 1AA004-26BAF-02.

Descriptors: Economics, *Cost-benefit analysis, *Air pollution effects, *Cost analysis, Damages, *Economic efficiency.

Air pollution is a problem because it endangers man's health and the environment in which he lives. The information researched in this report indicates that the cost of air pollution damage in 1970 (for measured effects only) falls within a range of $6.1 to $18.5 billion, with a 'best' estimate of $12.3 billion. A benefit-cost analytical framework for environmental decision-making is outlined. The methods that have been or can be used to estimate the damages of air pollution are identified. The strengths and weaknesses of each method are discussed. The technical coefficients method is utilized in estimating the value of air pollution damage to human health, to man-made materials, and to vegetation. A particular market study method, the property value approach, was used to estimate aesthetic and soiling-related costs. Economic losses associated with air pollution effects on domestic animals and wildlife and the natural environment are not estimated because of data limitations. Damages are allocated by major pollutant and source category. The utility and limitations of gross damage estimates are discussed, and comparison with other such estimates is made. (EPA)
W74-11798

A TEST METHOD FOR VOLATILE COMPONENT STRIPPING OF WASTE WATER,
Arkansas Univ., Fayetteville. Coll. of Engineering.
For primary bibliographic entry see Field 5D.
W74-11801

TRAIL-MARKING AND ALARM PHEROMONES OF SOME ANTS OF THE GENUS ATTA,
State Univ. of New York, Syracuse. Coll. of Environmental Science and Forestry.
R. G. Riley, and R. M. Silverstein.
Available from National Technical Information Service, Springfield, Va 22161 as PB-235 562, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA 660/2-74-081, February 1973. 27 p, 2 fig, 15 ref. Grant No 5 R01EP00829-03.

Descriptors: *Bioassay, *Chromatography, Pollutant identification, *Isolation, *Insects.
Identifiers: *Ants, Atta texana, Atta cephalotes, *Pheromones(Alarm), *Pheromones(Trail-marking).

Laboratory studies on two ant species of the Genus Atta, Atta texana and Atta cephalotes have resulted in the isolation and identification of several organic compounds which demonstrate either trail-marking or alarm activity. The alarm pheromones of Atta texana have been identified as 4-methyl-3-heptanone and 2-heptanone. A reinvestigation of this study has shown that Atta texana produces (+)-4-methyl-3-heptanone. This compound has also been identified as the alarm pheromone for Atta cephalotes. The volatile trail-marking substance of Atta texana has been identified as methyl-4-methylpyrrole-2-carboxylate. The isolation and identification of the non-volatile trail pheromone of Atta texana has led to inconclusive results due mainly to erratic bioassay results. Current laboratory research is being focused on the isolation and identification of the volatile trail pheromone(s) of Atta cephalotes. A synthesis of both enantiomers of 4-methyl-3-heptanone is in progress. Their biological activity will be tested on Atta texana and Atta cephalotes following successful completion of the synthesis. (EPA)
W74-11802

HERBICIDE RUNOFF FROM FOUR COASTAL PLAIN SOIL TYPES,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W74-11805

ANALYSIS OF BIOLOGICAL, CLINICAL, AND ENVIRONMENTAL SAMPLES USING PROTON-INDUCED X-RAY EMISSION,
Duke Univ. Durham, N.C. Dept. of Physics.
R. L. Walter, R. D. Willis, W. F. Gutknecht, and J. M. Joyce.
Analytical Chemistry, Vol 46, No 7, p 843-855, June, 1974. 19 fig, 16 ref.

Descriptors: *X-rays, *Analytical techniques, *X-ray fluorescence, *Sampling, Coal, Human pathology, Ion exchange, Membranes, Data collections, Irradiation, *North Carolina.
Identifiers: *Proton-induced x-rays, Solid state detector, Biological sampling, Clinical sampling, Environmental sampling, X-ray emissions, Durham(NC).

A 3Mev beam of protons of 2 to 150-nanoampere intensity has been used to excite x-ray emission from a wide range of environmental and biological samples. These include human tissue, body fluids, soil extracts, leaves, coal, fly ash, ion-exchange membranes, and proteins. The x-rays have been detected using a Si(Li) solid state detector for the elements P(Z=15) through Pb (Z=82). Linear response has been demonstrated for the elements Pb, Cu, Zn, Co, and Mn from 5 ng to greater than 2 micrograms. A lower limit of sensitivity of approximately 200 picograms in the irradiated area has been attained with the more responsive elements when they are deposited on very thin substrates. The proton-induced x-ray emission technique seems well suited to rapid and economical multielement analyses for samples of environmental and clinical interest. (Prague-FIRL)
W74-11862

INVESTIGATION OF VOLATILE ORGANIC MICROPOLLUTANTS IN AIR AND WATER USING LOW-TEMPERATURE CAPILLARY GC-MS,
Battelle-Institue e.V., Frankfurt am Main (West Germany).
K. H. Bergert, V. Betz, and D. Pruggmayer.
Chromatographia, Vol 7, No 3, p 115-121, March, 1974. 6 fig, 24 ref.

Descriptors: Pollutants, *Gas chromatography, *Mass spectrometry, Concentrations, Equipment, Analytical techniques, *Pollutant identification, *Air pollution.
Identifiers: *Organic micropollutants, Microgradient tubes, Low temperature.

A method is described which allows routine separation and identification of organic micropollutants within a concentration range 10 to the minus 4th power to 10 to the minus 8th power percent by volume. Enrichment of the components occurs in a microgradient tube. Separation on glass-thin film open tubular columns is by linear-programmed low-temperature gas chromatography (LTGC), and identification is by a mass spectrometer. Mass-spectra are obtained for concentration as low as 0.02 ppb. Analyses can be performed on commercial equipment. (Murphy-FIRL)
W74-11863

NEW GLOBAL WATCH FOR POLLUTION EFFECTS.
Industrial Research, Vol 16, No 5, p 23, 25, May, 1974.

Descriptors: *Monitoring, Water pollution, *Cadmium, *Mercury, *Flourides, *Arsenic, Facilities, Environmental control, Research, *Pollutant identification, Organic compounds.
Identifiers: *EARTHWATCH, United Nations Environment Program, Monitoring stations, Global pollution watch.

A global monitoring system is being set up by the United Nations Environment Program for assessing the worldwide environment and warning of possible hazards. The system is called EARTHWATCH and will monitor cadmium, nitrates, nitrites, mercury, petroleum hydrocarbons, fluorides, and arsenic in water. Monitoring stations will be global, regional, and local. Existing facilities will be incorporated in the networks, and some new stations established. (Murphy-FIRL)
W74-11866

POLAROGRAPHIC DETERMINATION OF 8-HYDROXYQUINOLINATES AFTER EXTRACTION WITH NAPHTHALENE. TRACE ANALYSIS OF CADMIUM AND LEAD,
T. Fujinaga, and B. K. Puri.
Bulletin of the Institution of Chemistry Research, Kyoto University, Vol 51, No 5, p 253-267, September, 1973. 4 fig, 9 tab, 12 ref.

Descriptors: *Polarographic analysis, *Cadmium, *Mercury, *Lead, Separation techniques, Analytical techniques, *Pollutant identification.

A rapid extraction-polarographic method has been developed for the direct determination of cadmium and lead extracted into the organic phase. 8-Hydroxyquinolinates of cadmium and lead were extracted with molten naphthalene in the pH range of 7-10 and 9-12 respectively; as the temperature was lowered, naphthalene separated out as a solid mass containing the metal-oxinate. This solid mass was dissolved in dimethylformamide and the polarograms were recorded using 0.1 M sodium perchlorate-0.1 M perchloric acid in case of cadmium and 0.1 M pyridine-0.1 M perchloric acid in case of lead as the supporting electrolytes. Under these conditions, these metal-oxinates gave well defined waves with E sub 1/2 of -0.63 V and -0.47 V versus SCE respectively. The relation between diffusion current and concentration is linear in the range of 0.0-112 micrograms/10 ml for Cd and 0.0-207.0 micrograms/10 ml for Pb. The interferences of various ions had been studied in detail. The method is simple, rapid, sensitive, and applicable for the determination of cadmium, mercury, and lead in various complex materials. (Sandoski-FIRL)
W74-11876

SPECTROPHOTOMETRIC DETERMINATION OF COPPER AND IRON SUBSEQUENT TO THE SIMULTANEOUS EXTRACTION OF BIS(2,9-DIMETHYL-1, 10-PENANTHROLINE) COPPER (I) AND BIS (2,4,6-TRI(2-PYRIDYL)-1, 3, 5-TRIAZINE) IRON (II) INTO PROPYLENE CARBONATE,
Wofford Coll., Spartanburg, S.C. Dept. of Chemistry.
B. G. Stephens, H. L. Felkel, Jr., and W. M. Spinelli.
Analytical Chemistry, Vol 46, No 6, p 692-696, May, 1974. 2 fig, 5 tab, 13 ref. PHS 0H00324.

Descriptors: *Copper, *Iron, *Spectroscopy, *Analytical techniques, Laboratory tests, Testing procedures, Instrumentation, Sea water, Aluminum, Potable water, *Pollutant identification.

Propylene carbonate (4-methyl-1,3-dioxolane-2-one) simultaneously extracts the 2,9-dimethyl-1, 10-phenanthroline (neocuproine; NC) chelate of copper (I) and the tri (2-pyridyl)-1,3,5-triazine (TPTZ) chelate of iron (II) from acetate-buffered aqueous solutions. Molecular absorption spectrophotometric quantification is accomplished by measuring the absorbance of the iron (II)-TPTZ chelate at 596 nm and that of the copper (I)-NC chelate at 458 nm. The copper (I)-NC chelate does not absorb at 596 nm and consequently copper does not interfere with the determination of iron. The iron (II) TPTZ chelate exhibits an absorbance at 458 nm that is 0.123 times its absorbance at 596 nm; therefore, correction for the effect of iron on the determination of copper is straightforward. The development of the method and the results of analyses of sea water, tap water, and aluminum alloy are reported. (Jernigan-Vanderbilt)
W74-11910

SELECTIVE SEPARATION AND CONCENTRATION OF SILVER VIA PRECIPITATION CHROMATOGRAPHY,
Massachusetts Univ., Amherst. Dept. of Chemistry.
W. P. Zeronsa, G. Dabkowski, and S. Siggia.
Analytical Chemistry, Vol 46, No 2, p 309-311, February, 1974. 3 tab, 2 fig, 16 ref. ACS(PRF 5399 AC).

Descriptors: *Separation techniques, *Silver, *Chemical precipitation, *Chromatography, *Analytical techniques, Aqueous solutions, Copper, Mercury, Testing procedures, Chemical reactions, Spectroscopy, Laboratory tests, Instrumentation, *Pollutant identification.

The application of terminal acetylenics to the selective analytical separation and concentration of silver is demonstrated. Other metalloacetylenic-derivatives which form easily and are reversible in aqueous systems were of interest. Other than silver (I), copper (I), and mercury (I and II), none of the metals proceeded to completion or reacted at all. A series of acetylenic compounds and supports was evaluated for column use in precipitation chromatography. Various eluents were also evaluated, and nitric acid was found to be the best for eluting silver. A commercially available, long chain terminal acetylene coated on a solid support was found to have the ability to selectively concentrate and/or separate various concentrations of silver from a variety of cations with minimal sample handling or cationic interferences and no unusual safety hazard. (Jernigan-Vanderbilt)
W74-11911

GRAPHITE BRAID ATOMIZER FOR ATOMIC ABSORPTION AND ATOMIC FLUORESCENCE SPECTROMETRY,
Michigan State Univ., East Lansing. Dept. of Chemistry.
A. Montaser, S. R. Goode, and S. R. Crouch.
Analytical Chemistry, Vol 46, No 4, p 599-601, April, 1974. 1 tab, 2 fig, 13 ref.

Descriptors: *Metals, *Spectroscopy, *Organic matter, Analytical techniques, Copper, Sampling, Instrumentation, Testing procedures, Zinc, Cadmium, Lead, *Pollutant identification.
Identifiers: *Sample preparation.

A new filament-type non-flame atomizer, the graphite braid atomizer (GBA) is described and characterized. The electrically heated GBA is capable of providing temperatures similar to other carbon or graphite atomizers, but with lower applied powers. The graphite braid was used in the AA and AF determination of several elements and showed good sensitivity and linearity. A procedure for the direct analysis of copper in a serum matrix is presented to illustrate the application of the GBA to biological samples. Only a dilution of the serum sample was required prior to the analysis step. (Jernigan-Vanderbilt)
W74-11912

PRELIMINARY STUDIES OF THE SHOCK TUBE AS AN EXCITATION SOURCE FOR THE ANALYSIS OF SELECTED TRACE METALS IN AQUEOUS MEDIA,
Michigan Univ., Ann Arbor. Dept. of Chemistry.
R. D. Sacks, and V. T. Cordasco.
Analytical Chemistry, Vol 46, No 6, p 663-670, May, 1974. 12 fig, 5 tab, 27 ref.

Descriptors: *Trace elements, *Analytical techniques, *Aqueous solutions, Cadmium, Nickel, Instrumentation, Spectroscopy, Heating metals, *Pollutant identification.
Identifiers: *Sample preparation, Shock tube.

The bursting-diaphragm shock tube has been developed for the analysis of selected trace metals in aqueous media. The theory of shock heating is discussed and relations are presented for strong shocks in a number of gases. The importance of shock-wave velocity measurements is considered and both analog and digital measurement techniques are presented. One-hundred microliter aqueous samples of metal salts are deposited on strips of membrane filter. These are supported in the shock tube and analyzed at 10,500K in the reflected region of helium-driven argon shocks. Analytical curves are presented for Pd, Cd, and Ni, both with and without internal standardization. Sub-ppm detection limits are obtained for most elements tested using 100-micro-l samples. The standard deviation is 15% for Cd and 13% for Pd. Matrix effects are significant only for refractory matrix materials. Internal standard selection is discussed with respect to the boiling points of the analyte and matrix. (Jernigan-Vanderbilt)
W74-11913

TRACE METALS IN NEW YORK STATE FISH,
Corning Glass Works, Research and Development Lab., N.Y.
For primary bibliographic entry see Field 5C.
W74-11934

OIL POLLUTION MONITORING IN THE LAGOON OF VENICE USING THE MUSSEL MYTILUS GALLOPROVINCIALIS,
Instituto di Biologia del Mare, Venice (Italy).
For primary bibliographic entry see Field 5C.
W74-11948

ALKANES AND ALKENES IN MARINE BENTHIC ALGAE,
Florida Technological Univ., Orlando. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W74-11951

ENVIRONMENTAL MONITORING AT THE PACIFIC NORTHWEST LABORATORY BY BATTELLE-NORTHWEST,
Battelle-Pacific Northwest Labs., Richland, Wash. Occupational and Environmental Safety Dept.
For primary bibliographic entry see Field 5B.
W74-11956

PROBLEMS OF RADIOECOLOGY IN CONNECTION WITH THE DEVELOPMENT OF NUCLEAR POWER,
Univerzita Pavala Jozefa Safarika, Kosice (Czechoslovakia). Faculty of Natural Science.
For primary bibliographic entry see Field 5B.
W74-11958

RATIO OF CS-137 -- SR-90 IN OCEAN AND SEA WATER,
Gosudarstvennyi Komitet po Ispolzovaniyu Atomnoi Energii SSSR, Moscow.
For primary bibliographic entry see Field 5B.
W74-11959

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE HALLAM NUCLEAR POWER FAVILITY, HALLAM, NEBRASKA, SEPTEMBER 20, 1968.
EG G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W74-11960

NSF-RANN TRACE CONTAMINANTS DIRECTORY, 1973,
Oak Ridge National Lab., Tenn. Toxic Materials Information Center.
E. D. Copenhaver.
Available from NTIS, Springfield, Va., 22161 as Rept. No. ORNL-EIS-73-62. $5.45/copy, $2.25/microfiche. Report No ORNL-EIS-73-62, August 1973. 75 p.

Descriptors: *Trace elements, Personnel management, Bibliographies, Technical writing, Toxicity, Universities, Research and development, Census, *Documentation, *Information exchange.
Identifiers: *Directories.

This directory is designed to aid effective communication throughout the National Science Foundation, Research Applied to National Needs, Trace Contaminants Program. The majority of the participants in the Program are represented--by name, address, telephone number, and very brief description of research interest. The research results are being abstracted in the new bi-monthly NSF-RANN Trace Contaminants Abstracts. The directory has three major divisions to facilitate its use. Section I contains listings of the program managers, the principal investigators, and the co-principal investigators and coordinators. Section II lists the personnel by individual projects; while Section III contains a complete alphabetic listing with keyword indexes. (Houser-ORNL)
W74-11961

AVAILABILITY OF DATA ON SURFACE-WATER QUANTITY AND QUALITY FOR THE SAN FRANCISCO BAY REGION, CALIFORNIA, WITH A SUMMARY OF BENEFICIAL USES AND IMPLICATIONS FOR LAND USE,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 7C.
W74-11980

AMMONIUM ION SPECIFIC ELECTRODE,
Department of Health, Education, and Welfare, Bethesda, Md.
For primary bibliographic entry see Field 2K.
W74-11984

GROUNDWATER AND GEOLOGY OF BARAGA COUNTY, MICHIGAN,
Geological Survey, Lansing, Mich.
For primary bibliographic entry see Field 4B.
W74-11987

SUSPENDED-SEDIMENT LOAD OF TEXAS STREAMS, COMPILATION REPORT OCTOBER 1965-SEPTEMBER 1971,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 2J.
W74-11991

5B. Sources Of Pollution

OBSERVATIONS ON THE DISTRIBUTION OF CHLORINATED HYDROCARBONS IN ATLANTIC OCEAN ORGANISMS,
Woods Hole Oceanographic Institution, Mass.
G. R. Harvey, H. P. Miklas, V. T. Bowen, and W. G. Steinhauer.
Journal of Marine Research, Vol 35, No 2, p 103-118, 1974. 3 fig, 5 tab, 27 ref.

Descriptors: *Polychlorinated biphenyls, *DDT, *Food webs, Absorption, Bioassay, Food chains, *Path of pollutants, Plankton, Pesticides, Gas chromatography, Analytical techniques, DDE, Phytoplankton, Dieldrin, Shrimp, Sharks, Lipids, Environmental effects, *Chlorinated hydrocarbon pesticides, Distribution.
Identifiers: Pelagic, Mesopelagic, Cod, Haddock, Pollock, Halibut, Dolphin.

Industrial PCBs and the DDT family (t-DDT) were measured in several species of organisms collected from the Atlantic Ocean between 66 deg N and 35 deg S latitude. All the organisms had higher concentrations of PCBs than t-DDT. Many trophic levels were collected, but the analytical data offer no support for food chain magnification among gilled organisms. Mixed plankton contained a higher average concentration of PCB (200 microgram/kg) than any other class of gilled organism in the Atlantic. Mesopelagic organisms revealed PCBs and t-DDT in concentrations well below the mixed layer, but ten times lower than pelagic species. The PCB/t-DDT ratio is about thirty in the marine atmosphere, surface water and plankton. The ratio decreases to about three in high predators and in the mid-water organisms, indicating that t-DDT and PCBs move differently through the marine environment. (Katz)
W74-11484

ACCUMULATION AND DEPURATION OF MERCURY IN THE AMERICAN OYSTER CRASSOSTREA VIRGINICA,
Delaware, Univ. Dept. of Biological Sciences. Newark.
For primary bibliographic entry see Field 5C.
W74-11490

SYMPOSIUM ON HYDROMETRY, VOLUME I AND II.
For primary bibliographic entry see Field 7B.
W74-11493

INSTRUMENTATION CONSIDERATIONS FOR STUDIES OF QUALITY OF RUNOFF FROM SMALL AGRICULTURAL WATERSHEDS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 7B.
W74-11545

SELECTED IRRIGATION RETURN FLOW QUALITY ABSTRACTS 1972-1973, THIRD ANNUAL ISSUE.
Dept. of Agricultural Engineering. EPA, Office of Research and Development Colorado State Univ., Fort Collins, Colo.
For primary bibliographic entry see Field 5G.
W74-11576

STREAM WATER QUALITY AS IT IS INFLUENCED BY URBAN COMMUNITIES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-11618

A MULTISOURCE ATMOSPHERIC TRANSPORT MODEL FOR DEPOSITION OF TRACE CONTAMINANTS,
Oak Ridge National Lab., Tenn.
M. T. Mills, and M. Reeves.
Available from National Technical Information Service, Springfield, Va., 22161 as Report No ORNL-NSF-EATC-2; $4.00 paper copy, $2.25 in microfiche. Report No ORNL-NSF-EATC-2, October 1973. 87 p, 4 fig, 9 ref. NSF AG 389.

Descriptors: Model studies, *Computer programs, *Computer models, Meteorology, Transport, Trace elements, *Air pollution, Toxins, Toxicity, Fallout, Hydrologic aspects, Streams, Groundwater, Ecology, *Path of pollutants, Water pollution sources.

Development is reported of an Atmospheric Transport Model (ATM) from a Gaussian plume model to calculate the toxic material deposition rate at any point within a watershed, given the location of various air pollution sources. The sources presently included are the point source (stack), area source (city), line source (road or railbed), and windblown source (dry tailings pond). These rates are then used by the Wisconsin Hydrological Transport Model (WHTM) to determine the subsequent transfer of the toxic materials to the stream and ground water. (Houser-ORNL)
W74-11651

ENVIRONMENTAL RADIATION DOSE CRITERIA AND ASSESSMENT: PATHWAY MODELING AND SURVEILLANCE,
Brookhaven National Lab., Upton, N.Y.
A. P. Hull.
Available from National Technical Information Service, Springfield, Va., 22161 as Report No BNL-18359; $4.00 paper copy, $2.25 in microfiche. Presented at the IEEE 1973 Nuclear Science Symposium (CONF-731112-16), San Francisco, Calif., Nov. 14-16, 1973, BNL-18359, Nov. 1973. 7 p, 3 tab, 26 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactivity, *Fuels, *Monitoring, *Assessment, *Safety, *Evaluation, Standards, Regulation, Administrative agencies, Model studies, *Path of pollutants, Cost-benefit theory.
Identifiers: *Fuel reprocessing plants, *Surveillance programs.

Considerable effort has been devoted to the development of environmental radiation dose criteria and assessment through both pathway modeling and environmental surveillance, ever since the first utilization of nuclear reactors in the United States in the 1940's, and particularly since the advent of civilian nuclear power reactors. Conservative effluent release practices, generally consistent with the as-low-as-practicable philosophy, have been followed. Within the past few years, extensive surveillance at representative nuclear facilities has indicated maximum doses of only a few millirems per year through a few pathways and to small nearby populations. They have been well below the environmental dose limits of 500 mrem/year specified by the ICRP for individuals in the general population, and also generally less than the basic Appendix I limit of 5 mrem/year, proposed by the AEC. However, the Appendix I implementation of this basic limit, in terms of the proposed release and concentration limits, is based on unrealistically conservative assumptions,

which exaggerate its supposed risk-reduction benefits. The benefits of devoting significant resources of manpower and equipment to such an effort toward the ever improvement in the sensitivity of modeling and surveillance of a minimal risk seem most questionable. (Houser-ORNL)
W74-11653

USE OF RIVERS TO PREDICT ACCUMULATION IN SEDIMENT OF RADIO-NUCLIDES DISCHARGED FROM NUCLEAR POWER STATIONS,
Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
P. Plato.
Health Physics, Vol 26, No 6, p 489-496, June 1974. 4 fig, 8 ref.

Descriptors: *Nuclear powerplants, *Radioactivity, Release, Effluents, *Lakes, *Streams, *Rivers, *Forecasting, Lake Michigan, Flow rates, Suspended solids, Flow characteristics, Measurement, Fallout, Cesium, *Sediments, Deltas, Sedimentation.

The liquid discharge characteristics, which include flow rate, suspended solids content, and radioactivity of the Donald C. Cook and Palisades nuclear power plants are similar to those from the St. Joseph and Black rivers, respectively, in southern Lake Michigan. The areas of influence of the rivers on Lake Michigan are defined by direct measurement of the accumulation of fallout Cs-137 in the sediments near the mouths of the rivers. The areas of influence of the rivers are used to predict the areas of influence expected near the two nuclear power plants after two decades of discharging radioactive wastes into Lake Michigan. An approach, part conceptual and part experimental, is described to examine two rivers as long-term point sources of radioactivity from fallout. When a river discharges its water into a relatively quiescent lake, suspended matter carried by the river settles to the bottom. A deltaic facies is formed where suspended matter from a river accumulates in relatively high amounts on the bottom of a lake. An examination of the deltaic facies for long-lived radionuclides from fallout should given an indication of the area of influence of the river on the lake during the past two decades. If the discharge characteristics of a river and a nearby nuclear power station are somewhat similar, a prediction could be made on the long-term influence of the nuclear power station on the lake. (Houser-ORNL)
W74-11654

MODELING RADIATION EXPOSURE TO POPULATIONS FROM RADIOACTIVITY RELEASED TO THE ENVIRONMENT,
California Univ., Livermore. Lawrence Livermore Lab.
Y. C. Ng, W. L. Robinson, and D. W. Wilson.
Available from National Technical Information Service, Springfield, Va., 22161 as Report No UCRL-74389, $4.00 paper copy; $2.25 in microfiche. Report No UCRL-74389, May 1973. 14 p, 6 tab, 44 ref.

Descriptors: *Model studies, *Radioactivity, *Projections, *Forecasting, *Effluents, Fallout, Public health, Environmental effects, Aquatic life, Food chains, Water pollution, *Air pollution, Soil contamination, Absorption, Water pollution sources, Safety, Evaluation.
Identifiers: Dosage, Man-rem.

Two approaches are used to estimate the potential population dosages (man-rem) per Curie release of Cesium-137 in the United States from a hypothetical release of a fraction of the projected fission product inventory in 2000. One method involves a parametric analysis of relationships between fallout rates and cesium-137 in the various components of the diet. The other method is a pathways analysis using dose-to-man models of radionuclide transport in the environment and uptake in man. Both methods are applied to an input-output model of radionuclide flux through environmental compartments and man. Population characteristics are developed using census data and dietary habits. Man-rem per Curie estimates are developed for several food-chains and external exposures. External exposure from soil burdens contributes well over half of the man-rem, followed by terrestrial food-chains, with much lower contributions coming from aquatic food chains. Submersion and inhalation exposure from either the initial cloud or from resuspension are insignificant contributions. Calculations by the two methods are in good agreement. The man-rem per Curie estimates are used to order the importance of the various routes of exposure and to investigate the significance of contamination in various parts of the environment. (Houser-ORNL)
W74-11655

ENVIRONMENTAL MONITORING REPORT, UNITED STATES ATOMIC ENERGY COMMISSION, OAK RIDGE FACILITIES, CALENDAR YEAR 1972.
Union Carbide Corp., Oak Ridge, Tenn.
Report No UCC-ND-244, July 1973. 42 p, 4 fig, 21 tab, 9 ref.

Descriptors: *Monitoring, *Environment, *Radioactivity, *Effluents, *Air pollution, *Tennessee River, *Water pollution, Soil contamination, Food chains, Sampling, Assay, Assessment, Streams, Lakes, Regulation, Public health, Toxicity, Tennessee.
Identifiers: White Oak Creek(TN), White Oak Lake(TN), Clinch River(TN), Poplar Creek(TN), Bear Creek(TN).

The Environmental Monitoring Program for the Oak Ridge area includes sampling and analysis of air, water from surface streams, several food products, flora, and soil for both radioactive and nonradioactive materials. A summary is presented of the results of the program for calendar year 1972. Surveillance of radioactivity in the Oak Ridge environs indicates the atmospheric concentrations of radioactivity were not significantly from other areas in East Tennessee. Concentrations of radioactivity in the Clinch River and in fish collected from the river were less than 1% of the permissible concentration and intake guides for individuals in the neighboring environment. Only very low-level radioactivity is being released to the environment from plant operations and the resulting concentrations in all of the media sampled were well below permissible standards. (Houser-ORNL)
W74-11658

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION, OAK RIDGE FACILITIES, CALENDAR YEAR 1971.
Union Carbide Corp., Oak Ridge, Tenn.
Report No UCC-ND-221, June 30, 1972. 38 p, 4 fig, 20 tab, 9 ref.

Descriptors: *Monitoring, *Environment, *Sampling, *Analytical techniques, *Assay, *Radioactivity, Safety, Evaluation, Public health, Air pollution, Water pollution, Soil contamination, Water pollution sources, Industrial production, Operations, Research facilities, *Tennessee.
Identifiers: Oak Ridge area(TN), Surveillance program, White Oak Creek(TN), White Oak Lake(TN), Clinch River(TN), Popular Creek(TN), Bear Creek(TN).

Results are presented of the environmental monitoring program for the Oak Ridge Tennessee area for calendar year 1971. The monitoring program includes sampling and analysis of air, water from surface streams, several food products, flora, and soil for both radioactive and non-radioactive materials. Surveillance of radioactivity in the Oak Ridge environs indicated that the atmospheric concentrations of radioactivity were not significantly different from other areas in east Tennessee. Concentrations of radioactivity in the Clinch River and in fish collected from the river were less than 1% of the permissible concentration and intake guides for individuals in neighboring populations. Only very low-level radioactivity is being released to the environment from plant operations and the resulting concentrations in all of the media sampled were well below permissible standards. (Houser-ORNL)
W74-11659

ENVIRONMENTAL LEVELS OF RADIOACTIVITY IN THE VICINITY OF THE LAWRENCE LIVERMORE LABORATORY - 1973 ANNUAL REPORT,
California Univ., Livermore. Lawrence Livermore Lab.
W. J. Silver, C. L. Lindeken, J. W. Meadows, W. H. Hutchin, and D. R. McIntyre.
Available from National Technical Information Service, Springfield, Va., 22161 as Report No UCRL-51547; $5.45 paper copy, $2.25 in microfiche. Report No UCRL-51547, March 1974. 52 p, 13 fig, 25 tab, 9 ref, append.

Descriptors: *Monitoring, *Environment, *Radioactivity, *Sampling, *Analytical techniques, *Data collections, Regulation, Management, Background radiation, Tritium, Fallout, Uranium, Plutonium, Strontium, Soils, Sediments, Surface waters, *California.

The Lawrence Livermore Laboratory continuously monitors the levels of radioactivity within the Livermore Valley and Site 300. Results of analyses performed during 1973 for gross radioactivity and for specific radionuclides of interest in a variety of environmental samples are presented. In all cases, the levels of activity observed during 1973 were found to be below the appropriate concentration guide values in AEC Manual Chapter 0524. Water samples collected within the Livermore Valley exhibited normal background gross beta and tritium activities. Gamma spectral analyses of vegetation samples revealed no gamma-emitting radionuclides other than those present naturally or in global fallout. Assessment of the radiation doses to an individual from the observed environmental activities indicates the contribution from artificially produced radionuclides is small in comparison with the approximately 100 mrem yr dose received from natural sources. (Houser-ORNL)
W74-11660

CONTROL AND TREATMENT OF RADIOACTIVE LIQUID WASTE EFFLUENTS AT THE SAVANNAH RIVER PLANT,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5D.
W74-11661

DEEP SELF-BURIAL OF RADIOACTIVE WASTES BY ROCK-MELTING CAPSULES,
New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
For primary bibliographic entry see Field 5E.
W74-11664

THE OCCURRENCE AND RETENTION OF RADIONUCLIDES IN THE SEDIMENTS OF WHITE OAK LAKE,
Oak Ridge National Laboratory, Tenn.
T. F. Lomenick, and D. A. Gardiner.
Health Physics, Vol 11, No 6, p 567-577, June 1965. 5 fig, 3 tab, 10 ref.

Descriptors: *Radioactive waste disposal, *Lake sediments, Lakes, Effluents, *Nuclear powerplants, Research and development, Laboratories,

Water pollution, Water pollution sources, Absorption, Soil contamination, Radioisotopes, Retention, Water storage, Ruthenium, Cesium, Strontium, Cobalt, *Tennessee, *Waste treatment.
Identifiers: *White Oak Lake(TN), *Clinch River(TN).

As a result of the discharges of large volumes of low-level radioactive liquid wastes to surface streams at the Oak Ridge National Laboratory, large quantities of radionuclides have assumulated in the bottom sediments of White Oak Lake. Ruthenium-106 (1038 c) and cesium-137 (704 c) account for more than 90% of the total activity now present at the site, while Co-60 (152 c), the rare earths (17 c, exclusive of Y-90), and Sr-90 (15 c) make up the remainder. More than half of the activity is associated with the upper 6-in. sediment layer, while progressively smaller quantities of activity are found with depth. The ruthenium, which is restricted to a small area in the area in the now dry upper lake bed, is partially water soluble; however, its rate of movement through the soil is slow enough so that radioactive decay reduces the concentration of that reaching surface streams to insignificant levels. Most of the Cs-137 occupies highly selective exchange sites on the illitic fraction of the clay in the sediment and can be desorbed only by disruption of the lattice structure. Only a small fraction of the Co-60 in the soil was found to be exchangeable. It is, therefore, unlikely that any large fraction of the Cs-137 or Co-60 would move from the area except through erosion of the sediment. About one-half of the Sr-90 and the rare earths in the sediment appears to be exchangeable, while the other half is in the form of slightly soluble salts. Through leaching by groundwater, a slow depletion of strontium from the dry part of the lake bed occurs. (Houser-ORNL)
W74-11665

CURRENT PROBLEMS IN THE RADIOECOLOGY OF SOILS AND PLANTS,
Safarik Univ., Kosice (Czechoslovakia).
G. Plitakova, T. Sabova, and M. Zaduban.
Soviet Atomic Energy, Vol 34, No 5, p 465-475, May 1973, 4 fig, 14 ref. Translated from Atomnaya Energiya, Vol 34, No 5, p 380-390, May 1973.

Descriptors: *Nuclear powerplants, *Nuclear explosions, Effluents, *Environmental effects, *Ecology, *Radioecology, *Water pollution, Oceans, Biota, Food chains, Public health, Elements(Chemical), Uranium, Plutonium, Thorium.

The main task of the relatively new scientific discipline known as radioecology is to investigate the laws governing the migration of radioactive substances in the biosphere and the effects of ionizing radiation on living organisms and on the earth's biosphere as a whole. From the fairly abundant experimental material already available today, it is concluded that mankind cannot afford to disregard the presence of radionuclides in nature. The problem of the contamination of food products by radionuclides is one of the most important problems in the field of public health. This is so because the role of the biological effects of small doses of radiation is not understood; the magnitude of the doses caused by the presence of radioactive substances in the daily diet have not yet been established. The contributor to the dose by various ionization sources is not known agreement has not been reached on the assessment of food contamination, etc. The fission of heavy nuclei, chiefly those of of U-235, Pu-239, and Th-232, gives rise to unstable nuclides (fission products), beginning with 30Zn-72 and ending with 66Dy-161, making a total of about 340 nuclides, of which 92 are stable. In nuclear explosions and in 'total' breakdowns of nuclear reactors, the important parameters of the radioactive fission products are their half-lives and the chemical properties characterizing their participation in the physiological processes of the living organisms of the biosphere. The fission products on which the greatest amount of research has been done are: Sr-89, Sr-90-Y90, Zr-95-Nb95, Ru-106-Rh-106, I-131, Cs-137- Ba-317m, Ba-140-La-140, Ce-144-Pr-144, and Pm-147. (Houser-ORNL)
W74-11666

ENVIRONMENTAL MONITORING REPORT, UNITED STATES ATOMIC ENERGY COMMISSION, OAK RIDGE FACILITIES, CALENDAR YEAR 1973.
Union Carbide Corp., Oak Ridge, Tenn.
Report No UCC-ND-280, May 2, 1974. 46 p, 4 fig, 24 tab, 13 ref.

Descriptors: *Monitoring, *Environment, *Radioactivity, *Air pollution, *Water pollution, *Tennessee River, Soil contamination, Food chains, Soils, Sampling, Assay, Streams, Rivers, Lakes, Regulation, Public health, Toxicity, *Tennessee.
Identifiers: White Oak Creek(TN), White Oak Lake(TN), Clinch River(TN), Poplar Creek(TN), Bear Creek(TN).

The Environmental Monitoring Program for the Oak Ridge area includes sampling and analysis of air, water from surface streams, several food products, flora, and soil for both radioactive and nonradioactive materials. A summary is presented of the results of the program for calendar year 1973. Surveillance of radioactivity in the Oak Ridge environs indicates the atmospheric concentrations of radioactivity were not significantly different from other areas in East Tennessee. Concentrations of radioactivity in the Clinch River and in fish collected from the river were less than 1% of the permissible concentration and intake guides for individuals in the off-site environment. While some radioactivity was released to the environment from plant operations, measurements in the Oak Ridge area show that environmental levels were well below established standards. (Houser-ORNL)
W74-11667

A SURVEY OF PAPERS ON ECOSYSTEMS ANALYSIS FROM 1947-1971 IN THE JOURNAL 'ECOLOGY',
Oak Ridge National Lab., Tenn.
B. B. McMullin.
Available from National Technical Information Service, Springfield, Va., 22161 as Report No ORNL-EIS-72-19; $4.00 paper copy, $2.25 in microfiche. Report No ORNL-EIS-72-19, March 1973. 50 p, 1 fig, 1 tab, 3 append.

Descriptors: Surveys, *Publications, *Bibliographies, *Ecosystems, *Systems analysis, Freshwater, Hydrology, Marine biology, Meteorology, Model studies, Cycling nutrients, Productivity, Environment, Habitats, Theoretical analysis.
Identifiers: *Literature survey.

A literary survey was conducted on all papers presented in the journal 'Ecology' from 1947-1971. All works invloving sub-processes or total systems analysis were identified and classified. A listing by author and title of the papers for each year that involved the systems analysis approach to ecology is presented. Subject categories used and a semi-hierarchial keyword list are included. (Houser-ORNL)
W74-11668

APPLIED HEALTH PHYSICS AND SAFETY ANNUAL REPORT 1971,
Oak Ridge National Lab., Tenn.
K. Z. Morgan, W. S. Snyder, and D. M. Davis.
Available from National Technical Information Service, Springfield, Va., 22161 as Report No ORNL-4795, $5.45 paper copy, $2.25 in microfiche. Report No ORNL-4795, June 1972. 61 p, 38 tab, 9 ref.

Descriptors: *Monitoring, *Safety, Evaluation, Assessment, Assay, *Air pollution, *Water pollution, Water pollution sources, Radioactive waste disposal, Data collections, Rivers, Tennessee River, Potable water, Drinking water, Fallout, Milk, Food chains, Fish, Background radiation, Effluent, Instrumentation, Measurement, *Tennessee.
Identifiers: Personnel exposure, Dose, Dosimetry, White Oak Creek(TN), White Oak Lake(TN), Clinch River(TN).

There were no external or internal exposures to personnel of the Oak Ridge National Laboratory which exceeded the standards for radiation protection as defined in AEC Manual Chapter 0524. There were no accidental releases of gaseous or liquid waste from the Laboratory which were of a level that required a report to the AEC. Ten unusual occurrences involving radioactive materials were recorded during 1971. Nine were recorded for 1970. However, the nine recorded in 1970 was the lowest number since the system of reporting unusual occurrences was established in 1960. The average number reported for the past five years (1966-1970) was 15.6. The safety record for 1971 was very good. As compared to 1970, there were 12.5% fewer medical treatment cases, 22.5% fewer serious injuries, and 20% fewer disabling injuries. The disabling injury frequency rate for 1971 was 0.61 as compared with a frequency rate of 0.76 for 1970. (Houser-ORNL)
W74-11669

THEORETICAL EXPERIMENTAL AND FIELD STUDIES CONCERNING REACTIONS OF RADIOISOTOPES WITH SEDIMENTS AND SUSPENDED PARTICLES OF THE SEA. PART C: APPLICATIONS TO FIELD STUDIES,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco). Oceanographic Museum.
E. K. Duursma, and D. Eisma.
Netherlands Journal of Sea Research, Vol 6, No 3, p 265-324, 1973. 14 fig, 2 tab, 49 ref, 4 append.

Descriptors: *Marine geology, *Sedimentation, *Radioactivity, *Radioisotopes, Behavior, Oceans, Seas, Clay minerals, Ion exchange, Organic matter, Sorption, Acids, *Sediments, Prediction, Forecasting, Waste disposal.

Results are reported of a cooperative study of the radionuclide sediment behavior of 59 characteristic marine sediments. The sediment samples were obtained from the sea floor of the three oceans, the Arctic Seas, the Baltic Sea, the North Sea, the Mediterranean, the Black Sea, and the Red Sea. The radionuclides studied were Sr-90, Cs-137, Zn-65, Co-60, Zr-95/Nb, Mn-54, Fe-59, Ru-106, Pm-147, and Ce-144. Only with Mediterranean sediment the behavior of Pu-240, Ca-45, Rb-86, and Pb-210 was investigated. The sediment composition has been investigated for clay minerals in different grainsize fractions, for median grain size and sorting, for specific surface, for exchange capacity, for organic matter, and for the extractability of the ions Na, K, Ca, Mg, and Fe with acetic acid NH4-acetate, 0.1 N HCl, 20% HCl, and concentrated HCl. Each of the parameters of the sediment composition has been related to the distribution coefficient of sorption which characterizes the radionuclide sediment behavior. The results of these studies may be applied to description and prediction of the behavior of various radionuclides in sea-water sediment systems. Using these data together with knowledge on the hydrography and sedimentology of an area, it may be possible to predict some of the consequences of future waste-disposal practices in this area. (Houser-ORNL)
W74-11670

REPORTS AVAILABLE IN PLOWSHARE OPEN FILE.
Nevada Operations Office (AEC), Las Vegas.

Available from NTIS, Springfield, Va, 22161 as Rept No NVO-86 (Rev 3); $4.00 paper copy, $2.25 in microfiche. Report No NVO-86 (Rev 3), July 1973. 40 p.

Descriptors: *Nuclear explosions, *Radioactivity, *Secondary recovery(Oil), Natural gas, Geology, Hydrology, Hydraulic engineering, Nuclear engineering, Technology, Research and development, Engineering geology, Toxicity, Public health, *Publications.
Identifiers: *Plowshare.

A significant compilation of scientific and technical information has resulted from Projects Gasbuggy, Rulison, Rio Blanco and Wagon Wheel, all of which are a part of the U.S. Atomic Energy Commission's Plowshare Program to develop peaceful uses for nuclear explosives. The fundamental concept in these underground engineering applications is to use the energy of a deeply buried nuclear explosive to increase the permeability and porosity of rock thereby stimulating the flow of natural gas. Publications concerning Gasbuggy, Rulison, Rio Blanco and Wagon Wheel, that have been placed in the Plowshare Open Files by the Nevada Operations Office are listed. All of these publications are available to the scientific, technical, and industrial communities. Also listed are certain other publications concerning the AEC's safety programs for underground nuclear detonations which may be of particular interest. (Houser-ORNL)
W74-11671

ECOLOGICAL-ENVIRONMENTAL ASSESSMENTS RELATED TO THE FEDERAL REPOSITORY,
Oak Ridge National Lab., Tenn.
R. C. Dahlman, and Y. Tanaka.
Available from NTIS, Springfield, Va 22161 as Report No ORNL-TM-3619; $5.45 paper copy, $2.25 in microfiche. Report No ORNL-TM-3619, July 1973. 55 p, 9 fig, 18 tab, 36 ref, 2 append.

Descriptors: *Radioactive waste disposal, Salts, Sodium compounds, Ecology, *Ecosystems, *Environmental effects, *Path of pollutants, Strontium, Cesium, Plutonium, Behavior, Food chains, Plant growth, Crops, Vegetation, Root systems, Absorption, Soil contamination, Meteorology, Precipitation(Atmospheric), *Kansas.
Identifiers: Salt mine, Lyons(Kan).

In ecological assessments related to the proposed federal repository at Lyons, Kansas, those environmental pathways which are expected to be important in radionuclide movements have been identified from on-site surveys by consultants from Kansas State University. Based on systems analysis techniques and existing literature information on radionuclide behavior in ecosystems, the dynamics of Sr-90 was estimated for plant, litter, soil pathways of a generalized grassland ecosystem. Continuous, low-level release of Sr-90 from repository operations would lead to threefold increases in the concentration in litter according to this stimulation. Subsequent redistribution or concentration through animal food chains are topics for further study. Preliminary assessment also has focused on energy balance in the biotic environment. (Houser-ORNL)
W74-11672

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED COMANCHE PEAK STEAM ELECTRIC STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
Available NTIS, Springfield, Va 22161 as Docket 50445-67; $10.60 paper copy, $2.25 in microfiche. Report No Docket 50445-67 and 50446-67, June 1974. 407 p, 37 fig, 83 tab, 253 ref, 5 append.

Descriptors: *Reservoirs, *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Texas.
Identifiers: *Pressurized water reactors, Squaw Creek Reservoir(Tex).

The proposed Comanche Peak Steam Electric Station, Units 1 and 2 will employ two pressurized water reactors located in Somervell County, Texas, which will be cooled by once-through flow of water obtained from and discharged to Squaw Creek Reservoir. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered included climate, hydrology (surface water and groundwater), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue construction permits subject to the following limitations: (1) Avoid unnecessary adverse environmental impacts during construction, (2) complete preoperational monitoring studies, (3) evaluate alternative intake systems, (4) design station for chlorine control as specified, (5) follow groundwater withdrawal specifications, (6) periodically review construction activities for conformity to conditions set out in construction permits, (7) report any need for evaluation of impacts unnoticed, (8) submit plan of action and analysis for any observed harmful effects or damage. (Houser-ORNL)
W74-11674

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED SUMMIT POWER STATION UNITS 1 AND 2 - DELMARVA POWER AND LIGHT COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va 22161 as Docket No 50450-97, $7.60 paper copy, $2.25 in microfiche. Report No Docket 50450-97 and 50451-97, July, 1974. 275 p, 39 fig, 67 tab, 180 ref, 9 append.

Descriptors: *Nuclear powerplants, Effluents, *Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Delaware, *Canals.
Identifiers: *Gas cooled reactors, *Chesapeake Canal, *Delaware Canal.

The proposed Summit Power Station - Units 1 and 2 is located in New Castle County, Delaware, and will employ two high-temperature gas-cooled reactors cooled by natural-draft hyperbolic cooling towers, using water from the Chesapeake and Delaware Canal. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and groundwater), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue construction permits subject to the following conditions: (1) Avoid all unnecessary adverse environmental impacts possible during construction; (2) Give written notice of unevaluated impacts and give acceptable analysis of these and a plan of action to eliminate them; (3) Take necessary steps to protect larval and young striped bass; (4) Control residual chlorine in the discharge; (5) Complete preoperational studies and monitoring as specified; (6) Get staff approval of modifications to the intake design. (Houser-ORNL)
W74-11675

CHLORINATION EXPERIMENTS AT THE JOHN E. AMOS PLANT OF THE APPALACHIAN POWER COMPANY: APRIL 9-10, 1973,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5A.
W74-11676

A MULTIDISCIPLINARY POLICY DECISION MODEL FOR WATER POLLUTION,
Newcastle Univ. (Australia).
For primary bibliographic entry see Field 5G.
W74-11686

WATER QUALITY INVESTIGATIONS ON FORESTED CATCHMENTS IN THE COTTER RIVER VALLEY,
Commonwealth Forestry and Timber Bureau, Canberra (Australia). Forest Research Inst.
S. J. Midgley.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973. University of Newcastle, New South Wales, University of Newcastle Research Associates Ltd., C. Aislabie, editor, p 114-118, 1973. 2 tab, 1 ref.

Descriptors: *Reservoirs, *Forest watersheds, *Water quality controls, *Water supply, *Forest fires, Conductivity, Potassium, Calcium, Sodium, Suspended solids, Sediments, Monitoring, Turbidity, Hydrogen ion concentration, *Australia.
Identifiers: Clear felling, Slash burning, Prescribed burning, Canberra(Aust), *Cotter River Valley(Aust).

Fourteen experimental forested water catchments are being monitored to determine the effects of fires in the forested areas on the water quality of the catchments. All are located on the Cotter River catchment, the supplier of the city of Canberra. Types of fires being studied are: clear felling of the pine cover followed by slash burning, low intensity prescribed burning, moderately intense wildfire. Preliminary studies of baseline data and control catchment data have been performed on the first two, and burning has been completed, but to date only limited data is available. On December 21, 1972, a wildfire occurred over 190 hectares of the experimental area. Samples were subsequently taken from the burnt catchment and compared with those taken from a similar unburnt catchment. Sediment and turbidity showed no significant difference but burning appeared to cause increases in conductivity (30 vs 65.9 umhos/cm), potassium (1.1 vs 2.0 ppm), magnesium (0.9 vs 3.8 ppm), calcium (1.6 vs 4.0 ppm), and sodium (3.1 vs 5.3 ppm). The lack of baseline data places some doubt on the differences. The lack of significant change in sediment (suspended solid) contradicts most earlier studies. It is believed that this is primarily due to the absence of high intensity rain events over the catchment. The light rain that fell may have served only to compact loose soil rather than erode it. (See also W74-11682) (LaPointe-North Carolina)
W74-11692

CONSTRAINTS TO SPREADING SEWAGE SLUDGE ON CROPLAND,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W74-11701

POLLUTION AND POISONING,
Southern Illinois Univ., Edwardsville.
S. K. Hall.

Environmental Science and Technology, Vol 6, No 1, p 31-35, January, 1972. 2 fig, 1 tab, 5 ref.

Descriptors: *Lead, *Toxicity, Inorganic compounds, Organic compounds, *Industrial wastes, Heavy metals, Water pollution effects, Water pollution sources.

Of the nonferrous metals, lead is one of the most widely used in industry and everyday life. The annual consumption in the U.S. alone, is well above one million tons. Today it is an ubiquitous element present in food, water, and air, and in the past two decades, man's continuing use of lead has produced an environmental level far above that which would exist naturally, and this could have grave consequences on human health. Lead is a natural constituent of soil, water, vegetation, animal life, and air. Significant sources of naturally occurring lead include dust from soils and particles from volcanoes. In contrast to certain other metals such as mercury, lead in its elemental form is not a major source of poisoning. Two major routes by which lead enters the human body are the alimentary and respiratory tracts. The mean dietary intake of lead for adult Americans is 300 micrograms/day. The average concentration of lead in American adult blood is 27 micrograms. Whether or not lead concentrations measured are hazardous to human health, any further increase of lead in the environment will result in further concentration in some food chains, leading ultimately to toxic doses for man or some other important organism. Lead pollution, therefore, must be controlled. (Jernigan-Vanderbilt)
W74-11702

TRANSFER OF MERCURY AND CADMIUM FROM TERRESTRIAL TO AQUATIC ECOSYSTEMS,
Oak Ridge National Lab., Tenn.
J. W. Huckabee, and B. G. Blaylock.
In: Metal Ions in Biological Systems, Plenum Publishing Corporation, New York, p 125-160, Sanat K. Dhar, editor, (1973). 10 fig, 1 tab, 43 ref.

Descriptors: *Mercury, *Cadmium, *Ecosystems, *Biological communities, *Ecological distribution, Food chains, Aquatic environment, Water pollution, Soil contamination, Transfer, Heavy metals, National parks.
Identifiers: *Great Smoky Mountains National Park.

A heavy metals research strategy proceeded in three steps: (1) determination of natural background concentrations of mercury and cadmium in biota in an unpolluted area, (2) microcosm experiments in which radiotracers were employed to illustrate the transfer of mercury and cadmium from terrestrial to aquatic ecosystems, (3) specific laboratory and field experiments suggested by the microcosm experiments or other data. The transfer rate of mercury and cadmium from terrestrial to aquatic ecosystems is dependent upon the residence time in the terrestrial compartments. The terrestrial cycling of inorganic mercury and cadmium was investigated by tagging field plots with soluble Hg203 and Cd109. At the end of one growing season, the vegetation contained four times more cadmium than mercury. The data indicate that inorganic mercury is lost more readily from vegetation than is cadmium. An uptake study with bean plants showed a large difference in the translocation rate and concentrations of inorganic and the most toxic methylmercury. Sixty-eight to 77% of Cd109 added to the terrestrial portion of the ecosystem was bound there in contrast to 42 to 54% of Hg203 bound. Stream and terrestrial experiments indicated the greater mobility of mercury in the environment. It was concluded that food chain uptake probably can account for a significant per cent of the mercury body burden in fish. (Jernigan-Vanderbilt)
W74-11703

EXPERIMENTAL INVESTIGATIONS ON THE ACCUMULATION OF MERCURY IN WATER ORGANISMS,
National Nature Conservancy Board, Drottningholm (Sweden).
For primary bibliographic entry see Field 5C.
W74-11704

HEALTH HAZARDS OF LEAD.
For primary bibliographic entry see Field 5C.
W74-11706

CHARACTERIZATION AND TREATABILITY OF CHROME TANNING WASTE,
Central Public Health Engineering Research Inst., Kanpur (India).
For primary bibliographic entry see Field 5D.
W74-11707

ASPECTS OF THE DISTRIBUTION AND TRACE ELEMENT COMPOSITION OF SUSPENDED MATTER IN THE BLACK SEA,
Woods Hole Oceanographic Institution, Mass.
D. W. Spencer, P. G. Brewer, and P. L. Sachs.
Geochimica et Cosmochimica Acta, Vol 36, p 71-86, 1972. 8 fig, 5 tab, 12 ref.

Descriptors: *Trace elements, *Suspended solids, Marine organisms, Adsorption, Chemical precipitation, Testing procedures, Analytical techniques, Distribution, *Path of pollutants, Water pollution sources.
Identifiers: *Black Sea, Sea of Azov.

Eight to 10 l water samples from the Black Sea collected in March and April, 1969 were filtered through 0.45 micron membrane filters. Detrital silicate particles from rivers dominated the suspended matter but a significant influence from the Sea of Azov was detectable. The concentrations of Mn, Fe, Co, Hg, Sc, Zn, La and Sb in the suspended matter have been determined by instrumental neutron activation analysis. From these data it is apparent that the distribution of these elements in vertical profiles is influenced by four processes: (1) The presence of detrital silicates; (2) Precipitation as sulfides in the deep water; (3) Coprecipitation with or adsorption by MnO2 that is precipitated just above the oxygen zero boundary. This is due to the upward flux of dissolved Mn(II) by advection and diffusion, and (4) Concentration by marine organisms in the surface waters. The profiles of scandium, lanthanum and iron are dominated by process (1) but processes (2), (3) and (4) also can be shown to be significant for iron. The manganese profile is dominated by process (3) and the zinc profile by process (2) while the profiles of cobalt, antimony and mercury are influenced by processes (1), (2) and (3). (Jernigan-Vanderbilt)
W74-11709

ALGAL ECOLOGY OF A STREAM POLLUTED THROUGH GOLD MINING ON THE WITWATERSRAND,
University of the Witwatersrand, Johannesburg (South Africa). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W74-11710

TOXICITY FOR CATS OF METHYLMERCURY IN CONTAMINATED FISH FROM SWEDISH LAKES AND OF METHYL-MERCURY HYDROXIDE ADDED TO FISH,
Research Inst. of National Defense, Sundbyberg (Sweden). Dept. of Pathology.
For primary bibliographic entry see Field 5C.
W74-11711

OBSERVATIONS ON MANGANESE IN GEORGIA WATERS,
Georgia Inst. of Tech., Atlanta. School of Applied Biology.
For primary bibliographic entry see Field 5F.
W74-11712

EFFECT OF MOLYBDENUM STARVATION AND TUNGSTEN ON THE SYNTHESIS OF NITROGENASE COMPONENTS IN KLEBSIELLA PNEUMONIAE,
Wisconsin Univ., Madison. Dept. of Bacteriology.
For primary bibliographic entry see Field 5C.
W74-11713

MERCURY CONCENTRATIONS IN FISH, PLANKTON, AND WATER FROM THREE WESTERN ATLANTIC ESTUARIES,
Long Island Univ., Greenvale, N.Y. Graduate Dept. of Marine Science.
For primary bibliographic entry see Field 5A.
W74-11715

BIOLOGIC EFFECT OF METALLIC CONTAMINANTS-THE NEXT STEP,
National Inst. of Environmental Health Sciences, Research Triangle Park, N.C.
For primary bibliographic entry see Field 5C.
W74-11720

LEAD IN NEW-FALLEN SNOW NEAR A LEAD SMELTER,
Institute of Occupational and Radiological Health, Belgrade (Yugoslavia).
Z. Kerin.
Archives of Environmental Health, Vol 26, No 5, p 257-259, May, 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Lead, *Snow, Distance, *Air pollution, Quantitative analysis, Analytical techniques, Time, Topography, Altitude, Industrial effluents, *Industrial wastes.
Identifiers: *Smelter, *Yugoslavia.

In a mountainous area of Yugoslavia, where a lead mine and smelter have been in operation for some 300 years, samples of new-fallen snow were obtained within three zones situated at increasing distances in different directions from the two centrally located stacks of the smelter, and were analyzed for their lead content. The lead content of new snow would be an indication of the quantities of lead in the air through which precipitation of moisture has occurred. The results confirmed the expectation that, with increasing distance from the source of lead emission, the snow contained consistently decreasing quantities of lead. Moreover, samples of new-fallen snow collected at altitudes that differed from that of the stacks yielded results that deviated from each other to such an extent as to alter significantly the negative correlation of the results with an increasing distance of the sampling sites from the stacks. (Rowe-Vanderbilt)
W74-11722

BIOCHEMICAL RESPONSES TO PROVOCATIVE CHELATION BY EDETATE DISODIUM CALCIUM,
Institute of Industrial Hygiene and Occupational Diseases, Prague (Czechoslavakia).
For primary bibliographic entry see Field 5C.
W74-11723

FATE AND EFFECTS OF OIL POLLUTANTS IN EXTREMELY COLD MARINE ENVIRONMENTS,
California Inst. of Tech., Pasadena. Jet Propulsion Lab.
R. M. Atlas.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-769 895, Price $3.00 printed copy; $2.25 microfiche. Final Report to Office of Naval Research, October 1973. 34 p, 6 fig, 5 tab, 16 ref. ONR Contract NAS 7-100.

Descriptors: *Oil spills, *Oily water, *Arctic, *Alaska, *Biodegradation, Water pollution effects, Water pollution treatment, Nutrients, Bacteria, Fungi, Algae, *Path of pollutants.

The interactions of microorganisms and Prudhoe crude oil were studied in Alaskan coastal waters. The main study site was located at Prudhoe Bay in Arctic Alaska. Some work was also done at Valdez, the proposed southern terminus for the trans-Alaskan pipeline. Other experiments were conducted at Umiat and Cape Simpson where there are large natural oil seepages. The rates of crude oil mineralization were higher for Prudhoe Bay water samples than for water samples collected at Valdez. Nitrogen and phosphate levels were about 0.5 ppm and 0.05 ppm respectively, which are lower than those levels required for extensive petroleum biodegradation. Total microbial populations were about 100/ml at Valdez and 1000/ml at Prudhoe Bay. Oil degrading microorganisms were about 0.1/ml at Valdez and 0.7/ml at Prudhoe Bay. When Prudhoe crude oil was incubated with water from coastal ponds along Prudhoe Bay, the bacterial populations increased in numbers by several orders of magnitude. There was a qualitative change in the algal population with a disappearance of coccoid green algae, but the remaining algae did not appear to be inhibited. Miniature contained oil slicks were floated in Prudhoe Bay. After 5 weeks of exposure, the nonbiological losses were 31%, the natural losses, including biodegradation (unfertilized), were 60% and the stimulated losses (fertilized) were 80% of the added oil by weight. (Knapp-USGS)
W74-11725

SURFACE JET STREAM EXCESS TEMPERATURE ANALYSIS,
Geological Survey, Bay Saint Louis, Miss.
E. Mackenroth, and L. H. Motz.
Available from NTIS, Springfield, Va. 22161 as PB-226 120, Price $3.75 printed copy; $2.25 microfiche. Computer Contribution, September 1973. 28 p, 2 fig, 8 ref, 5 append.

Descriptors: *Thermal pollution, *Mathematical models, *Computer programs, *Jets, *Path of pollutants, Streams, Streamflow, Open channel flow, Equations, Numerical analysis.

A computer program is designed for use with a mathematical two-dimensional model which predicts the behavior of a heated surface jet discharging into an ambient flowing stream. Variables which are predicted include jet temperature and velocity decay, jet trajectory, and jet width. The model is based on a joint solution of a system of ordinary differential equations. (Knapp-USGS)
W74-11748

MOVEMENT AND DISPERSION OF SOLUBLE MATERIALS IN SALEM CREEK, MUDDY CREEK AND YADKIN RIVER BETWEEN WINSTON-SALEM AND SALISBURY, NORTH CAROLINA,
Geological Survey, Raleigh, N.C.
K. L. Lindskov.
Available from NTIS, Springfield, Va. 22161 as PB-232 801, Price $3.25 printed copy; $2.25 microfiche. Water-Resources Investigation 6-74, 1974. 26 p, 12 fig, 2 tab, 11 ref.

Descriptors: *Path of pollutants, Rivers, *North Carolina, *Mixing, *Tracers, *Dispersion, Fluorescent dye, *Dye releases, Discharge(Water), Low flow, Water quality, Water pollution sources, Travel time.

Fluorescent dye was used to trace the movement of waterborne wastes over a reach of about 41 miles beginning at the sewage treatment plant on Salem Creek and ending on the Yadkin River at High Rock Lake near Salisbury, North Carolina. Total traveltime for the entire reach ranges from about 28 hours during periods of high streamflow to about 47 hours during periods of low flow. Longitudinal dispersion ranges from about 8 hours at the upper end of High Rock Lake during periods of high flow to about 15 hours during periods of low flow. During high-flow conditions wastes entering the Yadkin from Winston-Salem disperse across the river in a few miles. Under low-flow conditions lateral dispersion is still incomplete more than 10 miles downstream. Longitudinal dispersion causes the maximum concentrations resulting from slug injections to decrease significantly as the traveltime increases. Water entering the Yadkin River from Muddy Creek during low-flow periods does not completely disperse laterally for more than 10 miles below the confluence, but, when the Yadkin River discharge is above 5,000 cfs, lateral mixing is complete within a few miles below the confluence. (Knapp-USGS)
W74-11749

FEASIBILITY OF DIGITAL WATER-QUALITY MODELING ILLUSTRATED BY APPLICATION AT BARSTOW, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
S. G. Robson.
Water-Resources Investigations 46-73, February 1974. 66 p, 30 fig, 2 tab, 17 ref, append.

Descriptors: *Mathematical models, *Water quality, *Path of pollutants, *California, Simulation analysis, Costs, Data collections, Hydrogeology, Dispersion, Alluvium, Mixing, Groundwater movement.
Identifiers: *Barstow(CA).

The feasibility of a digital water-quality model of the shallow alluvial aquifer near Barstow, California, was evaluated to determine the applicability of the computer program to varied hydrologic problems. The evaluation was made on the basis of the data requirements of the model, the characteristics and limitations of the computer program, the relevance of the results, and the costs. Two-well tracer-dilution tests may not be an adequate means of determining the aquifer dispersivity and porosity for use in a water-quality model. Such tests may not be necessary because of the relative insensitivity of such a model to these parameters. The water-quality model is not readily applicable to hydrologic conditions such as abrupt changes in aquifer saturated thickness or transmissivity. Declines in head that are large in relation to the saturated thickness of the aquifer can cause disruptions in water-quality calculations in the model. When the model was tested, results were relevant to the real-life head and water-quality conditions in the aquifer near Barstow and provided an excellent means of evaluating the cause-and-effect relations associated with groundwater pollution. The cost of operating the water-quality model may be nominal if a small number of model nodes and a short simulation period can be used. (Knapp-USGS)
W74-11750

A WATER-QUALITY RECONNAISSANCE OF BIG BEAR LAKE, SAN BERNARDINO COUNTY, CALIFORNIA, 1972-73,
Geological Survey, Menlo Park, Calif.
G. A. Irwin, and M. Lemons.
Available from NTIS, Springfield, Va 22161 as PB-232 708, Price $3.25 printed copy; $2.25 microfiche. Water-Resources Investigations 3-74, May 1974. 40 p, 8 fig, 18 tab, 11 ref.

Descriptors: *Limnology, *Water quality, *Lakes, *California, Nutrients, Primary productivity, Water pollution sources, Water pollution effects, Irrigation water, Phosphates, Nitrates, Dissolved oxygen, Eutrophication.
Identifiers: *Big Bear Lake(Calif).

A water-quality reconnaissance study of the Big Bear Lake area in southern California was made from April 1972 through April 1973. The concentration and distribution of primary nutrients, organic carbon, dissolved oxygen, phytoplankton, and water temperature in the lake were measured. Nitrogen, phosphorus, and silica loading to the lake from surface-water tributaries and precipitation were estimated. Big Bear Lake is moderately eutrophic in regard to nitrogen, phosphorus, and organic content. Nitrate was found in either trace concentrations or below detectable limits; however, ammonia nitrogen was usually detected in concentrations greater than 0.05 milligrams per liter. Orthophosphate phosphorus was detected in mean concentrations ranging from 0.01 to 0.05 milligrams per liter. Organic nitrogen and phosphorus were also detected in measurable concentrations. Seasonal levels of dissolved oxygen indicated that the nutrients and other controlling factors were optimum for relatively high primary productivity. However, production varied both seasonally and areally in the lake. Primary productivity was highest in the eastern and middle parts of the lake. The middle and western parts of the lake exhibited severe oxygen deficits in the deeper water during the warmer months of June and July 1972. (Knapp-USGS)
W74-11753

SIMULATION OF MAJOR INORGANIC CHEMICAL CONCENTRATIONS AND LOADS IN STREAMFLOW,
Geological Survey, Washington, D.C.
T. D. Steele.
Available from NTIS, Springfield, Va 22161 as PB-222 556, Price $3.75 printed copy; $2.25 microfiche. Computer Contribution Interim Report, August 1973. 30 p, 3 fig, 2 tab, 6 ref.

Descriptors: *Computer programs, *Simulation analysis, *Water quality, *Water chemistry, Data processing, Data storage and retrieval.

A computer program is presented for simulation of concentrations and loads of major inorganic chemical constituents, based upon continued daily records of index variables such as specific conductance or stream discharge, and derived functional relationships between solute concentrations and one or both of the index variables. The simulation program estimates daily concentrations and loads of the major inorganic constituents and computes weekly, monthly, and annual time-weighted and discharge-weighted average concentrations. An ionic balance is calculated in each case where the relative abundance of the major ions is simulated or averaged, in order to serve as some measure of the adequacy of the technique. Numerous input and output options are provided, depending upon the availability of data and purposes of the program results. Two peripheral programs to the streamflow chemical-quality simulation program are described for obtaining the earlier-formatted daily constituent records. Card deck setup and job-control-language (JCL) cards required for the simulation program are also described. (Knapp-USGS)
W74-11764

A MODEL OF CIRCULATION AND DISPERSION IN PEARL HARBOR,
Environmental Prediction Research Facility (Navy), Monterey, Calif.
S. Larson.
Available from NTIS, Springfield, Va 22161 as AD-772 094, Price $3.00 printed copy; $2.25 microfiche. Technical Note No 9, November 1973. 32 p, 19 fig, 3 tab, 3 ref.

Descriptors: *Water circulation, *Harbors, *Hawaii, *Path of pollutants, Tides, *Dispersion, Mixing, Tidal streams, Estuaries, Water pollution *Model studies.
Identifiers: *Pearl Harbor(Hawaii).

Circulation and dispersion were studied in Pearl Harbor, Hawaii, using a single layer Hydrodynamical-Numerical model. The equations, the imposed boundary conditions, and the dispersion scheme

are briefly described. Examples of hourly volume transport and integrated volume transport are presented for three sections in the harbor. Examples of the velocity field at various times are also given. The maximum exchange between Pearl Harbor and the sea was found to be 8900 cu m over one tidal cycle. Streams discharging water into Pearl Harbor noticeably effect the local velocity field only during periods of slack water and incoming tide. (Knapp-USGS)
W74-11769

A TECHNIQUE FOR INTERPRETATION OF MULTISPECTRAL REMOTE SENSOR DATA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 7C.
W74-11773

CHARACTER AND SIGNIFICANCE OF HIGHWAY RUNOFF WATERS--A PRELIMINARY APPRAISAL,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W74-11775

ENCROACHING SALT WATER IN NORTHEAST PALM BEACH COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 7C.
W74-11779

GRANITE INDUSTRY WASTEWATER TREATMENT,
Vermont Dept. of Water Resources, Montpelier. Agency of Environmental Conservation.
For primary bibliographic entry see Field 5D.
W74-11790

STATE-OF-THE-ART: URANIUM MINING, MILLING, AND REFINING INDUSTRY.
Robert S. Kerr Environmental Lab., Ada, Okla.
For primary bibliographic entry see Field 5D.
W74-11791

COLOR CHARACTERIZATION BEFORE AND AFTER LIME TREATMENT,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 5D.
W74-11793

POLLUTED GROUNDWATER: A REVIEW OF THE SIGNIFICANT LITERATURE,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
D. K. Todd, and D. E. McNulty.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 556, $5.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA-600/4-74-001. March 1974. 215 p, 661 ref. Program Element 1H1325, EPA Contract 68-01-0759.

Descriptors: *Documentation, *Bibliographies, *Water pollution sources, *Water pollution effects, *Water pollution control, *Monitoring, Underground waste disposal, Aquifer management, *Groundwater, Management, Water pollution, Waste disposal wells, Saline water intrusion, Reviews, Path of pollutants.

A selective review is presented of the literature on man-caused groundwater pollution, including causes and occurrence, procedures for control, and methods for monitoring. No attempt was made to develop a comprehensive bibliography on the subject. Rather, references were selected for inclusion on the basis of their significance and relevance. Bibliographies, important general references, abstracts, and European references are discussed separately. Thereafter the literature is described in essay form on a subject basis. References cited by number in the text are listed in complete bibliographic form at the end of the report together with an author index. With few exceptions, the material reviewed is limited to relatively recent published items in the United States. Administrative regulations, legal reports, and unpublished materials such as these have been omitted. (EPA)
W74-11800

HERBICIDE RUNOFF FROM FOUR COASTAL PLAIN SOIL TYPES,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
G. W. Bailey, A. P. Barnett, W. R. Payne, Jr., and C. N. Smith.
Copy available from GPO Sup Doc as EP1.23:660/2-74-017, $1.45; microfiche from NTIS, Springfield, Va 22161 as PB-235 571, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-017, April 1974. 98 p, 23 fig, 12 tab, 31 ref, 3 append. EPA Program Element 1BB039.

Descriptors: Runoff, *Herbicides, Simulated rainfall, *Soil types, Coastal plains, Gas chromatography, *Path of pollutants, *Sediments, Pollutant identification, Water pollution sources.
Identifiers: *Pesticide movement, Preferential herbicide loss, Atrazine, Dichlobenil, Fallow plots.

The movement of two herbicides in runoff and on sediment were studied as examples of pesticides in general use. Gas chromatography was used to determine the losses of atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-triazine) and dichlobenil (2,6-dichlorobenzonitrile) from fallow plots on four Coastal Plain soil types following the application of about 13 cm (5 in.) of rainfall in 2 hours. The herbicides, as wettable powders, were surface-applied and incorporated. Simulated high intensity (a 100-year frequency storm) rainfall was started 1 hour after application. Significant amounts of both compounds were transported. The percent loss was greater in all cases for atrazine, but because more dichlobenil was applied, its losses were greater on an absolute basis. Some of the herbicide in the sediment may have been transported as discrete particles rather than as an adsorbate. The greatest combined (runoff plus sediment) losses of atrazine in all soils and of dichlobenil in two soils occurred during the first 40-50 minutes of runoff. During this time, the absolute amount of both herbicides was greater in runoff, but the concentrations were greater in the sediment. The preferential loss of certain claysized materials during the first 50 minutes of runoff may explain the high herbicide concentration in sediment relative to later times. (EPA)
W74-11805

GROUNDWATER CONTAMINATION IN THE NORTHEAST STATES,
Geraghty and Miller, Inc., Port Washington, N.Y.
D. W. Miller, F. A. DeLuca, and T. L. Tessier.
Copy available from GPO Sup Doc as EP1.23:660/2-74-056, $3.30; microfiche from NTIS, Springfield, Va 22161 as PB-235 702, $2.25. Paper copy $5.80. Environmental Protection Agency, Technology Series Report EPA-660/2-74-056, June 1974. 325 p, 41 fig, 47 tab, 403 ref, 2 append. EPA Program Element 1BA024. Contract No 68-01-0777.

Descriptors: *Groundwater, *Water pollution sources, *Landfills, *Septic tanks, *Waste storage, *Northeast U.S., New York, New Jersey, Pennsylvania, Maryland, Delaware, Research priorities, Water quality control, Degradation(Decomposition).

An evaluation of principal sources of groundwater contamination has been carried out in 11 northeast states, including all of New England, New York, New Jersey, Pennsylvania, Maryland, and Delaware. The findings have been used to determine priorities for research into ways to correct existing sources of contamination and to point out deficiencies in present control methods for protection against further degradation of groundwater quality. Principal sources of groundwater quality degradation caused by man's activities that are common to most parts of the region are septic tanks and cesspools, buried tanks and pipelines including sanitary and storm sewers, the application and storage of highway deicing salts, municipal and industrial landfills of solid waste, unlined surface impoundments, spills, and the uncontrolled discharge of pollutants on the land surface. In New York and Pennsylvania, mining and petroleum exploration and development have caused many instances of groundwater contamination, but the extent of the problem has not been defined. Salt-water intrusion in coastal areas has been adequately controlled, but little is known of the potential threat to fresh-water aquifers from the encroachment of saline water that naturally occurs in inland formations underlying the western portions of the region. (Scalf-EPA)
W74-11806

SLUDGE CHARACTERISTICS OF MUNICIPAL SOLIDS,
Rutgers - The State Univ., New Brunswick, N.J. Coll. of Agriculture and Environmental Science.
For primary bibliographic entry see Field 5D.
W74-11834

DISPOSAL AND REUSE OF SLUDGE AND SEWAGE: WHAT ARE THE OPTIONS,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W74-11835

MUNICIPAL EFFLUENT CHARACTERISTICS,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
J. V. Hunter.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 165-180, 1973. 9 tab, 16 ref.

Descriptors: *Municipal wastes, *Effluents, Investigations, Chemical properties, Physical properties, Activated sludge, Organic matter, Heavy metals, Inorganic compounds, *Waste identification.
Identifiers: *Waste characteristics.

The physical and chemical characteristics of secondary effluents are presented with results of the following investigations statistically tabulated: total solids distributions for an activated sludge effluent, variation in effluent quality of an activated sludge plant, organic parameter distributions for an actual sludge effluent, chemical composition of soluble-colloidal organic matter in a trickling filter effluent, composition of trickling filter effluent particulates, average inorganic composition of municipal secondary effluents, general composition of secondary treatment plant effluents, and heavy metal constituents of secondary treatment plant effluents. Although there have been extensive investigations into the nature of the organic constituents of effluents, most of the particulate organics are still unknown and even the soluble organics have only been classified by solubility and extractive procedures rather than by molecular species present. (See also W74-11833) (Sandoski-FIRL)
W74-11847

FATE OF MATERIALS APPLIED,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
R. E. Thomas.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 181-200, 1973. 15 ref.

Descriptors: *Suspended solids, *Nutrients, *Waste water treatment, Infiltration, *Irrigation systems, Land management, Waste disposal, Overland flow, *Path of pollutants.

The fate of suspended solids, major plant nutrients of environmental concern, and other selected constituents of waste water when this waste water is applied to the soil are summarized. Methods of application include the crop irrigation, infiltration, and spray-runoff. An insight into the mechanism involved and the practical aspects in the treatment or renovation of waste water by applying the waste water to the land is presented. (See also W74-11833) (Sandoski-FIRL)
W74-11848

NUTRIENT LOADING FROM A SEPARATE STORM SEWER IN MADISON, WISCONSIN,
Bechtel Corp., San Francisco, Calif.
J. W. Kluesener, and G. F. Lee.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 920-936, May, 1974. 16 fig, 3 tab, 14 ref.

Descriptors: *Urban runoff, *Separated sewers, *Rainfall-runoff relationships, Nutrients, Lakes, Basins, Nitrogen, Phosphorus, Flow, Rainfall, Sampling, Storm water, Storm runoff, *Wisconsin, Storm sewers.
Identifiers: *Nutrient loading, Chemical data, *Madison(Wis).

A study was undertaken to explore implications of nutrient loading from separate storm sewers and characteristics of nutrients in urban runoff. The following determinations were attempted: rainfall-runoff relationships for a selected basin in Madison, Wisconsin; seasonal and storm-duration variability of nutrient concentrations; annual nutrient loading; sampling requirements for nutrient loading quantification; significance of urban runoff with respect to other known sources of nutrients influent to a lake in Madison. Percent runoff was found to be equivalent to the area of the basin covered by streets, and varied as a function of rainfall amount. Nutrient and SS concentrations were greatest during the early stages of a runoff event; high phosphorus concentrations occurred during the spring and fall, while nitrogen concentration was high during the spring. The major source of inorganic-N was rainfall, whereas phosphorus was generated by litter and possibly by auto exhaust. Preference for sampling procedures are in the following order: (1) flow-proportioned sampler; (2) characterization of a basin by collection of flow and chemical data over fairly short time intervals for several storms. (Murphy-FIRL)
W74-11853

STUDIES ON MODELING OF URBAN STORM WATER RUNOFF--ON THE RELATION BETWEEN THE COMPOSITION OF BASIN MODEL AND THE EQUIVALENT ROUGHNESS,
E. Toyokuni, and K. Hagihara.
Memoirs of the Ehime University, Section III (Engineering), Vol 7, No 1, p 49-64, 1974. 12 fig, 1 tab, 18 ref.

Descriptors: *Storm runoff, *Hydrological data, *Model studies, Drainage, Drainage areas, Surface drainage, Urban runoff.
Identifiers: *Kinematic wave method, Urban storm water runoff, *Japan.

On the basis of observed hydrological data in a research basin, the relation between the composition of the basin model in the homogeneous surface and the equivalent roughness for each model and adaptability of the runoff model are discussed. These are representations of equivalent drainage area for the heterogeneous area composed of roof, asphalt road, or pervious ground surface. Each of three models, one simple and two more complex, are derived theoretically from the elements of composition in the basin model, applying the kinematic wave method. (Prague-FIRL)
W74-11855

THE ESTUARY AND INDUSTRIAL WASTES: POWER PLANTS,
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 5D.
W74-11869

POPULATION, RESOURCES, AND POLLUTION, AND THEIR IMPACT ON THE HUDSON ESTUARY,
Woods Hole Oceanographic Institution, Mass.
B. H. Ketchum.
Hudson River Colloquium, Annals of the New York Academy of Sciences, Vol 250, p 144-156, May 24, 1974. 10 fig, 1 tab, 13 ref.

Descriptors: *Data collections, *Hudson River, *Surveys, Sewage disposal, Nutrients, Water pollution sources, Water pollution control, Environmental effects, Phosphorus, Phytoplankton, Chlorophyll, *Estuarine environment, *New York.

Data are presented on the distribution properties in the lower end of the Hudson estuary so as to define and delineate some of the problems that should be further investigated. Such data indicate that the Hudson River estuary is not itself capable of accepting and recycling the nutrients that are being added to it in the sewage from the population of the city of New York. Adequate control of the domestic sewage will require the removal of a substantial part of the nutrients as well as the removal of the organic material that creates the biochemical oxygen demand. (Sandoski-FIRL)
W74-11870

SEDIMENT AND WASTE DEPOSITION IN NEW YORK HARBOR,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
M. G. Gross.
Hudson River Colloquium, Annals of the New York Academy of Sciences, Vol 250, p 112-128, May 24, 1974. 3 fig, 6 tab, 36 ref.

Descriptors: *Hudson River, *Estuaries, Sediments, Wastes, *Sediment load, Water circulation, Geologic history, Sands, Gravels, New York, *Path of pollutants.
Identifiers: *New York Harbor, Estuarine alterations, Waste deposition.

The physical alterations of the Hudson River estuary are discussed with particular attention being paid to the sediments and waste deposits that covered much of the harbor bottom and large areas of New York Bight in 1972. The following topics are mentioned: recent geologic history, dredging of the Hudson Estuary, water movements, sediment sources, sand and gravel production in New York Harbor, sediment and waste deposits, and future changes to the estuary. (Sandoski-FIRL)
W74-11874

UPTAKE OF MERCURIC CHLORIDE AND METHYLMERCURY CHLORIDE FROM LIQUID MEDIA BY ASPERGILLUS NIGER AND PENICILLIUM NOTATUM,
Texas Women's Univ., Denton. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W74-11877

THE ILLINOIS URBAN DRAINAGE AREA SIMULATOR, ILLUDAS,
Illinois State Water Survey, Urbana.
M. L. Terstriep, and J. B. Stall.
Bulletin 58, 1974. 90 p, 82 fig, 34 tab, 33 ref.

Descriptors: *Model studies, *Urban hydrology, *Computer models, *Urban drainage, *Watersheds(Basins), Drainage area, Drainage systems, Storm runoff, Mathematical models, Urban runoff, Hydrology, Sewers, Hydrographs, Overland flow, Surface runoff, Computer programs, Simulation analysis, Infiltration, Rainfall-runoff relationships, Routing, Hydrologic systems, Hydrologic aspects, Storm drains, Vegetation effects, Floods, Runoff forecasting, Paved areas, Drainage, Rainfall, Hydraulics.
Identifiers: Drainage design, Hydrologic simulation.

An objective method is presented for the hydrologic design of storm drainage systems in urban areas and for the evaluation of an existing system. The method, based on a digital model known as The Illinois Urban Drainage Area Simulator (ILLUDAS), uses storm rainfall and physical basin parameters to predict storm runoff from both paved areas and grassed areas. ILLUDAS utilizes the directly connected paved area concept of the British Road Research Laboratory (RRL) method but also recognizes and reproduces runoff from grassed and nonconnected paved areas. Included are a description of the theoretical development of the model, verification of the model by its application to 21 existing urban basins in the United States (from 0.39 acres to 8.3 square miles) and 2 rural basins, and a users manual that describes in detail the actual use of ILLUDAS in design applications. The ILLUDAS is available in the form of a 700-card FORTRAN IV deck. A description of the input deck in its proper order and the actual content and format for each card are presented. This model provides consulting engineers with an objective and reliable method for urban storm drainage design that requires little more input data than a rational method solution. (Humphreys-ISWS)
W74-11889

DO-SAG IN OSCILLATING FLOW,
Syracuse Univ., N.Y. Dept. of Civil Engineering.
W-H. Li, and M. E. Kozlowski.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE4, Proceedings Paper 10713, p 837-854, August 1974. 9 fig, 11 ref, 2 append. NSF Grant No. GK-33815.

Descriptors: *Oxygen sag, *Tidal streams, *Dispersion, *Mathematical models, Biochemical oxygen demand, Dissolved oxygen, Water pollution, Flow, Rivers, Outfall sewers, Environmental engineering, Mathematics, Analytical techniques.
Identifiers: *Oscillating flow.

The biochemical oxygen demand (BOD) and the dissolved oxygen (DO) deficit in an oscillating flow due to a steady supply of BOD from an outfall were studied. Formulas were derived for the maximum BOD concentration and DO deficit by the method of perturbation. These results serve as the upper bounds for a tidal river during a dry season. (Humphreys-ISWS)
W74-11897

THE NORTH ATLANTIC OCEAN AS A SOURCE OF ATMOSPHERIC N2O,
Max-Planck-Institut fuer Chemie, Mainz (West Germany).
For primary bibliographic entry see Field 2K.
W74-11900

RAPID COASTAL BOTTOM WATER TEMPERATURE RISES,
Raytheon Co., Portsmouth, R.I. Oceanographic and Environmental Services.
For primary bibliographic entry see Field 2L.
W74-11901

CARBON MONOXIDE IN THE SOUTH PACIFIC OCEAN,
Navel Research Lab., Washington, D.C.
For primary bibliographic entry see Field 2K.
W74-11904

CONCENTRATION OF HEAVY METALS IN SEDIMENT CORES FROM SELECTED WISCONSIN LAKES,
Wisconsin Univ., Madison. Dept. of Soil Science.
I. K. Iskandar, and D. R. Keeney.
Environmental Science and Technology, Vol 8, No 2, p 165-170, February, 1974. 5 fig, 5 tab, 34 ref. 133-7659.

Descriptors: *Heavy metals, *Wisconsin, *Lake sediments, Spectroscopy, Water pollution, Distribution patterns, Copper, Zinc, Cadmium, Lead, Nickel, Chromium, Temporal distribution, Water pollution sources.

The concentrations of Cu, Zn, Cd, Pb, Cr, and Ni in sediment cores from five hard-water and five soft-water lakes in Wisconsin were determined. Based on estimates of sedimentation rates, the sediment samples used for estimation of the early cultural or precultural concentrations were deposited 140 to 400 years ago. The precultural concentrations of Cu, Zn, Cd, and Pb were, in nearly all cases, less than those of postcultural and especially of modern (0-10cm) sediments. In general, there was no significant trend in the vertical distribution of Ni, but four of the 10 lakes had accumulated Cr in recent times. The accumulation of Cu in three of the hard-water lakes investigated was related to copper sulfate (used as an algalcide) input from 1918 to 1944. Surface enrichment may have been due to runoff from urban and agricultural lands and from sewage inputs. The noticeable buildup in Pb was attributed mainly to atmospheric loading. (Rowe-Vanderbilt)
W74-11915

MERCURY CONCENTRATIONS IN TISSUES OF FISH FROM THE CONNECTICUT RIVER,
Massachusetts Univ., Amherst.
S. R. DiNardi, K. S. Wisnieski, and E. C. MacDonald.
Journal of Environmental Health, Vol 36, No 6, p 547-551, May/June 1974. 4 tab, 14 ref.

Descriptors: *Mercury, *Fish, *Animal pathology, *Public health, Human pathology, Regulations, Pollution, Testing procedures, Analytical techniques, Spectroscopy, Distribution, *Connecticut River.

The purpose was to evaluate the threat of mercury to fish and to man by determining mercury concentrations of five common species of fish from the Connecticut River; to see if species sampled meet the Food and Drug Administration (FDA) limit of 0.500 ppm of mercury in fish; to find a species that may serve as an index of mercury pollution for surveillance purposes; and to determine if significant differences of mercury occur among the species and tissue sites within species. The five species tested were the American shad, Pumpkinseed, Yellow Perch, Smallmouth Bass, and White Sucker with Rainbow Trout serving as the control. It was concluded that: (1) The quantity of mercury in these species of fish in the Connecticut River currently is not a threat to man; (2) All fish tested were within the FDA standard. The highest sample mean was 0.186 ppm (White Sucker) and the highest individual portion was 0.283; (3) The White sucker, with the highest average concentration, will serve as an index species; (4) This experiment emphasized the importance of taking portions from three axial muscle sites to obtain more stable determinations. When single portions or several portions from one axial muscle site were tested, there were wide variations in results. (Jernigan-Vanderbilt)
W74-11917

HOW MUCH METAL IS THERE IN OUR WATERS,
J. Josephson.
Environmental Science and Technology, Vol 8, No 2, p 112-113, February, 1974, 1 photo.

Descriptors: *Heavy metals, *Bodies of water, *Toxicity, *Conferences, Trace elements, Aquatic life, Public health, Human pathology, Food chains, Mercury, Lead, Cadmium, Regulation, Research priorities.

Research presented at a conference held in December, 1973 in Nashville, Tennessee on heavy metals in the aquatic environment is summarized. Symptoms and incidence of Minamata disease, caused by increased methylmercury intake, and of Itai-Itai disease, caused by increased cadmium intake are covered. The cycling of lead from autos and lead mines and smelters to soils and water can contaminate crops grown nearby. Some concentration of metals is necessary, but setting limits on how much is safe has been difficult due to analytical variations, interactions among various metals and economic considerations. Research needs include studies of tolerance to metals, subclinical and genetic effects, removal methods and time, and transfer mechanisms through food chains. (Eagle-Vanderbilt)
W74-11918

CADMIUM - A TRACE ELEMENT OF CONCERN IN MINING AND MANUFACTURING,
D. B. Cox.
Journal of Environmental Health, Vol 36, No 4, p 361-363, January/February, 1974. 9 ref.

Descriptors: *Cadmium, *Trace elements, *Zinc, *Industrial wastes, *Mining, Public health, Human pathology, Human diseases, Chemical precipitation, Electrolysis, Air pollution, Water pollution, Pesticides, *Path of pollutants.

Cadmium is relatively new to industrialists and chemists. It was discovered in 1817 and is produced entirely as a by-product of zinc production. In the roasting or sintering of zinc concentrates before smelting, cadmium is driven off as an oxide fume to be collected in baghouses or electrostatic precipitators. Here incomplete capture of cadmium oxide results in air pollution. Cadmium is also produced as impure metallic sponge in one of the steps of zinc electrolysis. Improper treatment of the electrolytic solution before release causes water pollution. In the United States the highest air concentrations have been found in Covington, Kentucky, where brass and bronze products are manufactured, and in Chicago, where there is much heavy industry. Cadmium concentration in growing plants is a function of concentration in soil and also is related to pH and the inherent ability of plants to absorb it. The highest concentrations in food are not in plant derived foods, but in shellfish. Hypertension, emphysema and chronic pulmonary disorders are the chief health problems directly attributed to cadmium. (Jernigan-Vanderbilt)
W74-11919

PESTICIDE TRANSPORT AND RUNOFF MODEL FOR AGRICULTURAL LANDS,
Hydrocomp, Inc., Palo Alto, Calif.
N. H. Crawford, and A. S. Donigian, Jr.
Copy available from GPO Sup Doc as EP1.23:660/2-74-013, $2.40; microfiche from NTIS, Springfield, Va 22161 as PB-235 723, PC$4.90/$2.25 MF. Environmental Protection Agency, Technology Series Report EPA-660/2-74-013, December 1973. 211 p, 44 fig, 19 tab, 51 ref, 3 append. EPA Program Element 1BB039. 68-01-0887.

Descriptors: Regulation, *Pesticide drift, *Sediment transport, Mathematical models, *Agricultural runoff, Volatility, *Path of pollutants, *Model studies, Water pollution sources.
Identifiers: *Pesticide transport, Pesticide-soil adsorption.

The development and testing of a mathematical model to simulate the loss of pesticides from agricultural lands are presented. The Pesticide Transport and Runoff (PTR) Model is composed of submodels concerned with hydrology, sediment loss, pesticide-soil interaction, and pesticide attenuation functions. The Model 'piggybacks' the applied pesticide onto the movement of water through the soil profile and the loss of water and sediment from the land surface. The pesticide-soil interaction is based on the Freundlich adsorption-desorption isotherm. Attenuation functions of volatilization and degradation are provided but were not tested due to lack of data. Comparison of simulated and recorded runoff and sediment loss showed considerable agreement. Simulated pesticide loss agreed reasonably well with recorded values for those pesticides completely adsorbed on sediment particles. The Freundlich adsorption model did not accurately predict the division between the adsorbed and dissolved states for those pesticides which are transported by runoff and sediment loss. Recommendations for future work include further calibration and testing of the PTR Model, and additional development on the pesticide adsorption and attenuation functions. The regulation of pesticide releases to the environment is explored as a possible eventual use of the PTR Model. (EPA)
W74-11920

PESTICIDE MOVEMENT FROM CROPLAND INTO LAKE ERIE,
Ohio State Univ., Columbus. Dept. of Entomology.
A. C. Waldron.
Copy available from GPO Sup Doc as EP1.23:660/2-74-032, $1.40; microfiche from NTIS, Springfield, Va 22161 as PB-235 650, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-032, April 1974. 96 p, 17 tab, 24 ref, 7 append. EPA Project 13020 EBL, RSFD 3256-A1.

Descriptors: *Pesticide residues, Pesticides, Water pollution sources, *Chlorinated hydrocarbon pesticides, *Organophosphorus pesticides, *Insecticides, *Herbicides, Triazine pesticides, DDT, DDD, DDE, Dieldrin, Heptachlor, 2,4-D, 2,4,5-T, Phosphorothioate pesticides, Soil contamination, *Path of pollutants, Lake Erie, Gas chromatography.
Identifiers: Chlorophenoxy acid herbicides, Concentration levels, Atrazine, Dicamba, Heptachlor epoxide, Thimet, Diazinon, Malthion, Parathion, Ethyl parathion, Methyl parathion, Lindane, Methoxychlor, Simazine, Bladex, Phorate.

Gas chromatographic analysis of water and bottom mud sediment samples collected monthly during a one-year period from sites on the Maumee, Portage, Sandusky, Huron, and Grand River systems indicated only very infrequent and sporatic occurrence of minute concentrations of pesticide residues. Samples were analyzed for organochlorine and organophosphate insecticides and for triazine and chlorophenoxy acid herbicides. Concentrations of residues in the few positive analyses were generally less than 10 parts per billion for detected insecticides and less than 50 ppb for triazine herbicide. Diazinon, dieldrin, and the DDT family of compounds were the most common insecticides detected. Atrazine was the most often detected herbicide. An indication of chlorophenoxy and herbicide residue in one water

and one bottom sediment sample was very questionable. The insecticide residues were generally associated with bottom sediment, whereas atrazine was associated with both water and sediment samples. The association of pesticide residues with particular river sites and sampling periods was inconsistent although limited correlation between residue occurrence and the early spring agricultural soil preparation and planting season was observed at one or two sites on two rivers. No valid basis was provided to adequately assess the agricultural versus municipal sources of pesticide contamination. During the period of this study, it appeared that pesticide contamination of northern Ohio rivers was negligible and the contribution to pesticide pollution of Lake Erie was insignificant. (EPA)
W74-11922

ENVIRONMENTAL EVALUATION BASED ON RELATIVE GROWTH RATES OF FISHES,
Tulane Univ., New Orleans, La. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-11937

HIGH ZINC CONCENTRATION IN COMMON CARP VISCERA,
Academia Sinica, Taipei (Taiwan). Inst. of Zoology.
For primary bibliographic entry see Field 5C.
W74-11946

THE PRESENT AND FUTURE SITUATION OF NUCLEAR ENERGY PRODUCTION AND ITS ASSOCIATED INDUSTRY--NORMAL OPERATION, ACCIDENT PREVENTION AND MITIGATION, COMPARATIVE RISK ASSESSMENT,
Directorate-General for Industrial, Technological and Scientific Affairs. Commission of the European Communities, Brussels (Belgium).
For primary bibliographic entry see Field 5C.
W74-11953

ENVIRONMENTAL MONITORING REPORT, PERIOD COVERING MAY 1, 1973 THROUGH JULY 31, 1973 FOR EL PASO NATURAL GAS COMPANY.
Eberline Instrument Corp., Santa Fe, N. Mex. Santa Fe Lab.
Available from NTIS, Springfield, Va., as 22161, as PNE-WW-32; $4/copy; $2.25 microfiche. Report No. PNE-WW-32, 1973. 25 p, 19 tab.

Descriptors: *Monitoring, *Radiation, *Radioisotopes, *Background radiation, Environment, *Water pollution, *Air pollution, *Assay, Evaluation, Soils, Water, Milk, Tritium, Strontium, Cesium, Iodine, Plutonium, Barium, Potable water, Lakes, Streams, Ponds, Vegetation, Precipitation(Atmospheric).
Identifiers: Plowshare program, Urine, Wagon Wheel Project, Big Sandy Reservoir, East Fork River, Fall Creek, Fremont Lake, Green River, New Fork River, Silver Creek, Stock ponds.

The Radiological Monitoring Program for Project Wagon Wheel was initiated in May 1971. The program will continue indefinitely until such time as there is no further need for radiological monitoring. The measurement of background radiation and environmental radioactivity levels is intended to serve the following purposes: (a) To yield average values for radiation levels and concentrations of radioactive materials in various media in the environment. (b) To identify optimum sample locations and/or types of samples that deviate from the averages. (c) To document seasonal variations that could be erroneously interpreted. (d) To indicate the range of values that should be considered 'background' for various types of samples. (e) To 'proof test' the environmental monitoring equipment and procedures. (Houser-ORNL)
W74-11954

ENVIRONMENTAL CONTROL IN NUCLEAR FUEL REPROCESSING,
Emory Univ., Atlanta, Ga.
R. B. Platt, J. M. Palms, H. L. Ragsdale, D. J. Shure, and P. G. Mayer.
Chemical Engineering Progress, Vol 70, No 4, p 87-88, April 1974. 1 fig.

Descriptors: *Monitoring, *Environmental control, *Radioactivity, *Effluents, *Fuels, Background radiation, Ecology, Plants, Animals, Ecosystems, Radioecology, Hydrology, Meteorology, Environmental effects, Measurement, Assessment, Hazards, Warning systems, Model studies, Safety, Evaluation.
Identifiers: *Fuel reprocessing.

An environmental monitoring program was formally initiated in June 1970, by the formulation of a set of objectives by Barnwell Nuclear Fuel Reprocessing Plant (BNFP) personnel. These objectives were tougher and asked more penetrating questions than were then being used for the nuclear industry. Therefore, by their very nature, they required greater comprehension and depth than existed at that time for development of monitoring procedures. To achieve the objectives, close interaction was required and an interdisciplinary team which would collectively represent competence in plant and animal radiation ecology, hydrology, meteorology, radionuclide measurement and evaluation, and ecosystem modeling and analysis. Accordingly, a University-based team was organized in August 1970. (Houser-ORNL)
W74-11955

ENVIRONMENTAL MONITORING AT THE PACIFIC NORTHWEST LABORATORY BY BATTELLE-NORTHWEST,
Battelle-Pacific Northwest Labs., Richland, Wash. Occupational and Environmental Safety Dept.
J. P. Corley.
Available from NTIS, Springfield, Va., 22161 as Report No. BNWL-SA-4839; $4/copy, $2.25 microfiche. From: 66th Annual Meeting of the American Institute of Chemical Engineers; Philadelphia, Pennsylvania, Nov. 11, 1973 (CONF-731109-2), Report BNWL-SA-4839, Oct. 1973. 21 p, 6 fig, 5 tab, 5 ref.

Descriptors: *Monitoring, *Radioactivity, *Sites, *Nuclear powerplants, *Effluents, *Columbia River, Water pollution, Path of pollutants, Water, Milk, Food chains, Vegetation, Fish, Soil, Diets, Groundwater, Potable water, Public health.
Identifiers: Hanford Site.

The surveillance program for radioactivity at the Hanford site generally follows the guides established by the International Commission on Radiological Protection and are enumerated as follows: (A) Detection of sudden changes and evaluation of long-term trends of concentrations in the environment, with the intent to detect failure or lack of adequate control of releases and to initiate appropriate actions. (B) Assessment of the actual or potential exposure of man to radioactive materials or radiation present in his environment, or the estimation of the probable upper limits of such exposure. (C) Determination of the fate of contaminants released to the environment, especially with the intent of detecting previously unconsidered mechanisms of exposure. (D) Demonstration of compliance with applicable regulations and legal requirements concerning releases to the environment. The program described meets the objectives listed. To detect trends, to estimate the contribution of plant effluents to the radiation dose received by the local population, and to demonstrate compliance with applicable regulations. Flexibility within appropriate cost controls has permitted needed response to changing plant operations and environmental conditions. (Houser-ORNL)
W74-11956

ASSESSING POTENTIAL RADIOLOGICAL IMPACTS TO AQUATIC BIOTA IN RESPONSE TO THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) OF 1969,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-11957

PROBLEMS OF RADIOECOLOGY IN CONNECTION WITH THE DEVELOPMENT OF NUCLEAR POWER,
Univerzita Pavala Jozefa Safarika, Kosice (Czechoslovakia). Faculty of Natural Science.
M. Zaduban.
Soviet Atomic Energy, Vol 34, No 5, p 460-464, 1973, 3 fig, 2 tab, 14 ref. Translated from Atomnaya Energ'ya, Vol 34, No 5, p 376-380, May 1973.

Descriptors: *Nuclear powerplants, *Ecology, *Ecosystems, *Environmental effects, Water pollution, Rivers, Waste disposal, Effluents, Uranium, Thorium, Food chains, Public health, Economics, Elements(Chemical), Radioisotopes, Oceans.
Identifiers: *Danube River.

Attention is drawn to factors which accompany the development of nuclear power and produce an effect on the environment. Using the desirable and undesirable features of the development of nuclear power as a basis, mankind can and must set up the proper conditions for its peaceful 'coexistence' with the biosphere. At the same time, it is essential to formulate criteria for an assessment of such coexistence, taking account of economics and of natural laws. In ecological investigations there is a progression from an individual to a population, then to a biocenosis, to an ecosystem, to the environment, and finally to the biosphere. In contrast to this, in investigation is enlarged by the addition of a source of unstable nuclides. The purpose of radioecology is a comprehensive investigation of biospheric processes in which natural and artificial nuclides take part, their relationship to the environment and to the food chains of mankind, animals, and plants, and also the possibility of modifying these processes. Man's productive activity must follow certain fundamental laws of nature and human society and the requirements of economic expediency. (Houser-ORNL)
W74-11958

RATIO OF CS-137 -- SR-90 IN OCEAN AND SEA WATER,
Gosudarstvennyi Komitet po Ispolzovaniyu Atomnoi Energii SSSR, Moscow.
A. G. Trusov, L. M. Ivanova, and L. I. Gedeonov.
Soviet Atomic Energy, Vol 34, No 5, p 481-482, May 1973. Translated from Atomnaya Energiya, Vol 34, No 5, p 394, May 1973.

Descriptors: *Radioisotopes, *Strontium, *Cesium, Bodies of water, Oceans, Seas, Biocontrol, *Path of pollutants, Hazards, Analysis, Radioactivity, Aquatic environment, Distribution, Distribution patterns, Chemical properties, Physical properties, Analytical techniques, Assay, Sampling.

Among the artificial radioisotopes that precipitate into the sea medium, the greatest biological hazard is Sr-90 and Cs-137. To determine the pathways of the spread of these radioisotopes in the aqueous medium and to predict their further distribution, it is necessary to know in what state they penetrate into sea water, and in what state they exist in it. The Sr-90 and Cs-137 that have penetrated into the ocean water are in such a degree of dilution that it is difficult to find a direct method of determining their physical state and chemical forms. Valuable information in this respect can be obtained from data on the ratio of the concentrations of Cs-137 and Sr-90 in sea water. Results are discussed of a large number of simultaneous determinations of Cs-137 and Sr-90, performed since 1963 and ac-

cording to the same method, as well as the results of analyses of samples of sea water, collected on the 20th voyage of the scientific research ship 'M. Lomonosov' and in the first and second voyages of the scientific research ship 'Akademik Vernadskii' for surface waters, waters from intermediate layers and from great depths. (Houser-ORNL)
W74-11959

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE HALLAM NUCLEAR POWER FAVILITY, HALLAM, NEBRASKA, SEPTEMBER 20, 1968.
EG G, Inc., Las Vegas, Nev.
Available from NTIS, Springfield, Va., 22161 as Rept. No. ARMS-68-6-7. $4/copy, $2.25/microfiche. Atomic Energy Commission, Report No. ARMS-68-6-7, May 1974. 18 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Monitoring, *Nuclear powerplants, Effluents, *Surveys, *Radioactivity, Instrumentation, Nuclear wastes, Remote sensing, Public health, Background radiation, Radioisotopes, *Nebraska.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Hallam Nuclear Power Facility during September 1968, four years after reactor shutdown. The survey measured terrestial gamma radiation with special emphasis given to instrumentation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of a 200 square mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background. (Houser-ORNL)
W74-11960

NSF-RANN TRACE CONTAMINANTS DIRECTORY, 1973,
Oak Ridge National Lab., Tenn. Toxic Materials Information Center.
For primary bibliographic entry see Field 5A.
W74-11961

GENERALIZATION OF STREAM TRAVEL RATES AND DISPERSION CHARACTERISTICS FROM TIME-OF-TRAVEL MEASUREMENTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2E.
W74-11971

INVESTIGATION OF DIFFUSION IN OPEN-CHANNEL FLOWS,
Geological Survey, Bay Saint Louis, Miss.
For primary bibliographic entry see Field 2E.
W74-11972

EFFECTS OF SEPTIC TANK EFFLUENT ON GROUNDWATER QUALITY, DADE COUNTY, FLORIDA: AN INTERIM REPORT,
Geological Survey, Tallahassee, Fla.
W. A. J. Pitt, Jr.
Open-file report 74010, 1974. 79 p, 17 fig, 10 tab, 7 ref, append.

Descriptors: *Septic tanks, *Path of pollutants, *Florida, *Water pollution effects, Sampling, Water quality, Groundwater, Soil disposal fields, Coliforms.
Identifiers: *Dade County(FL).

At each of five sites in Dade County, Florida, where septic tanks have been in operation for at least 15 years and where septic tank concentration is less than 5 per acre, a drainfield site was investigated to determine the effects of septic tank effluent on the quality of the water in the Biscayne Aquifer. At each site two sets of multiple depth wells were drilled. The upgradient wells were constructed in such a way that the aquifer could be sampled at 10, 20, 30, 40, and 60 feet below land surface. The downgradient wells are 35 feet or more from the upgradient wells in the direction of groundwater flow, and also allow the aquifer to be sampled at various depths. Except at one site, no fecal coliforms were found below the 10-foot depth. Total coliforms exceeded a count of one colony per ml at the 60-foot depth at two sites. At one site a fecal streptococci count of 53 colonies per ml was found at the 60-foot depth and at another a count of seven colonies was found at the 40-foot depth. The three types of bacteria occur in higher concentration in the northern areas of the county than in the south. Bacteria concentrations were also higher where the septic tanks were more concentrated. (Knapp-USGS)
W74-11975

BIODEGRADATION OF OIL IN SEA WATER FOR NAVAL POLLUTION CONTROL,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 5G.
W74-11976

ASSESSMENT OF THE ECOLOGICAL CONSEQUENCES OF HERBICIDE USE ALONG TRANSMISSION LINE RIGHTS-OF-WAY AND RECOMMENDATION FOR SUCH USE,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5C.
W74-11977

DOCUMENTATION FOR SNSIM1/2, A COMPUTER PROGRAM FOR THE STEADY-STATE WATER QUALITY SIMULATION OF A STREAM NETWORK,
Environmental Protection Agency, New York. Data Systems Branch.
R. E. Braster, and S. C. Chapra.
Available from NTIS, Springfield, Va 22161 as PB-227 159, Price $3.25 printed copy; $2.25 microfiche. September 5, 1973. Second edition. 43 p, 2 fig, 4 ref, 2 append.

Descriptors: *Path of pollutants, *Mathematical models, *Computer programs, Water pollution sources, Water pollution effects, Simulation analysis, Dissolved oxygen, Oxygen demand, Biochemical oxygen demand.

A mathematical model was written to determine the levels of dissolved oxygen (DO), carbonaceous biochemical oxygen demand (CBOD), and nitrogenous biochemical oxygen demand (NBOD) in a stream. It was designed to evaluate and predict the dissolved oxygen, and the carbonaceous and nitrogenous BOD profiles in a river or stream where the effects of dispersion can be assumed to be insignificant. The stream network consists of a river and its tributaries which are segmented into sections of constant hydrologic, physical, chemical and biological parameters. Loads may be applied pointwise at the ends of the section or as distributed sources along its length. (Knapp-USGS)
W74-11978

A BIBLIOGRAPHY ON OCEAN WASTE DISPOSAL.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5E.
W74-11985

MICROBIAL DEGRADATION OF DDT,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
M. Alexander.
Available from NTIS, Springfield, Va 22161 as AD-762 469, Price $3.00 printed copy; $2.25 microfiche. Annual Report No 1, July 1, 1973. 24 p, 3 fig, 4 tab, 24 ref. ONR Contract N00014-67-A-0077-0027.

Descriptors: *DDT, *Biodegradation, *Marine bacteria, Aquatic bacteria, Path of pollutants, *Pesticide residues, *Water pollution control, Water quality, Aquatic fungi, Marine fungi.

Marine bacteria were tested for their ability to degrade DDT. Forty-seven converted 5% to 10% of the DDT to water-soluble products, 38 solubilized less than 5% of the insecticide, and 29 were apparently inactive. Mucor alternans, a fungus exceptionally active in producing water-soluble metabolites from DDT, was used as a model for determining the identities of the water-soluble metabolites. Although these compounds have not yet been identified, they are not DDT, DDA, DBH, DBP, PCPA, or 2-chlorosuccinic acid. (Knapp-USGS)
W74-11992

A NETWORK FOR CONTINUOUS MONITORING OF WATER QUALITY IN THE TRINITY RIVER BASIN, TEXAS,
Geological Survey, Austin, Tex.
J. F. Blakey, and P. W. Skinner.
Open-file report, May 1974. 26 p, 1 fig, 3 tab, 1 ref, 2 append.

Descriptors: *Monitoring, *Water quality, *Telemetry, *Data collections, *Texas, Equipment, Water pollution, Instrumentation, Data transmission, Rivers.
Identifiers: *Trinity River Basin(TX).

A continuous water-quality monitoring network is recommended for the Trinity River basin, Texas. Equipment, installation, operation, maintenance, and cost considerations are described for continuous measurement, recording, and transmission of data to central receiving stations. The data produced by the network can be obtained by any party installing a receiving station. The basic set of water-quality parameters recommended for the network includes dissolved oxygen, temperature, pH, and specific conductance. For illustration, seven possible monitoring stations, one central-control, and one slave-central station are considered in detail. The total costs for constructing the network is estimated at $192,670. The costs for operation and maintenance of the network is estimated at $82,700 per year. Records collected at permanent locations would be supplemented by data collected with one or more mobile monitors. (Knapp-USGS)
W74-11995

AN APPROACH TO ESTIMATING FLOOD FREQUENCY FOR URBAN AREAS IN OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
For primary bibliographic entry see Field 4A.
W74-11998

5C. Effects Of Pollution

ENVIRONMENTAL STATEMENTS AND WATER RESOURCE PLANNING IN NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 6G.
W74-11460

EFFECTS OF SALT MARSH IMPOUNDMENTS ON MOSQUITO POPULATIONS,
North Carolina State Univ., Raleigh. Dept. of Entomology.
R. N. LaSalle, and K. L. Knight.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 264; $4.00 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Partial Completion Report No 92, (UNC-WRRI-74-92), April 1974. 85 p, 20 fig, 34 tab, 19 ref, append. OWRTB-057-NC(1). 14-31-0001-3919.

Descriptors: *Salt marshes, *North Carolina, *Marsh management, Impoundments, *Mosquitoes, Wetlands, Environmental effects.
Identifiers: Carteret County(NC), Pamlico County(NC), Anopheles bradleyi, Anopheles atropos, Culex salinarias, Juncas roemerianus, *Mosquito control.

Four impoundments constructed in salt marshes in coastal North Carolina were studied to determine their effects on mosquito production, primarily Aedes taeniorhynchus (Weidemann), A. sollicitans (Walker), Anopheles bradleyi King, An. atropos Dyar and Knab and Culex salinarius Coquillett. Effects of impoundments on vegetation were also observed. Large patches of Distichlis spicata (L.) and Spartina patens (Aiton) interspersed throughout the unimpounded marsh dominated by Juncus roemerianus Scheele (Black Needlerush) were often eliminated after installation of an impoundment. J. roemerianus was, in most cases, also destroyed after flooding, remaining in the impoundment in large dead stands. Ruppia maritima L., or widgeon grass was the dominant plant species in one impoundment. Impoundments were effective in reducing mosquitoes, especially Aedes species, provided proper management of impoundments is practiced including maintenance of minimum depths (12 inches or more), control of emergent vegetation, provision of top water minnows, and maintenance of dikes. At water depths greater than one foot, vegetation was submerged and/or dispersed sufficiently to eliminate the conditions conducive to Anopheles and Culex breeding. (McJunkin-North Carolina State)
W74-11461

LETHAL RESPONSE BY ATLANTIC SALMON PARR. TO SOME POLYOXYETHYLATED CATIONIC AND NONIONIC SURFACTANTS,
Fisheries Research Board of Canada, St. Andrews (New Brunswick). Biological Station.
D. J. Wildish.
Water Research, Vol 8, No 7, p 433-437, 1974. 2 fig, 5 tab, 12 ref.

Descriptors: *Lethal limit, *Surfactants, *Atlantic salmon, Toxicity, Animal physiology, Bioassay, Methodology, Cations, Salmon, Chemical properties, Chemical reactions, Biological membranes, Lipids, Water pollution effects.
Identifiers: *Lethal response, *Polyoxyethylated surfactant, *Salmo salar, Oil dispersants, Lauric acid, Parr, Detoxification.

Lethal response of Atlantic salmon parr, as 96-h LC50, is semi-logarithmically related to the number of moles of ethylene oxide in the polyoxyethylated surfactant. 96-h LC50 of polyoxyethylene (10) monolaurate = 7.5 mg/1, polyoxyethylene (10 lauryl ether = 3.5 mg/1, and polyoxyethylene (10) octadecyl amine = 0.2 mg/1. Evidence is presented which suggests that polyoxyethylene esters with up to 18-20 moles of ethylene oxide are partially detoxified in the animal, resulting in changes in lethal response. Possible physiological explanations for the relationship between polyoxyethylene chain length and lethality involve uptake rates and attainment of a critical concentration of surfactant at the unknown active site. (Katz)
W74-11481

LONG-TERM CHANGES IN THE PLANKTON OF EUTROPHIC MIKOLAJSKIE LAKE AS AN EFFECT OF ACCELERATED EUTROPHICATION,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
I. Spodniewska, A. Hillbricht-Ilkowska, and T. Weglenska.
Bull Acad Pol Sci Ser Sci Biol. vol 21, No 3, p 215-221. 1973, Illus.

Descriptors: *Eutrophication, *Phytoplankton, Lakes, Biomass, Rotifers.
Identifiers: Mikolajskie Lake, Poland.

Seasonal changes were studied in the phytoplankton biomass and production as well as in zooplankton abundance in eutrophic Mikolajskie Lake (Poland) during 1963-1970. The increase in the biomass of phytoplankton was recorded in summer as well as the increase in crustacean and rotifer abundance and size of individuals. These changes seem to be the effects of accelerated eutrophication of the lake.--Copyright 1974, Biological Abstracts, Inc.
W74-11482

LETHALITY AND BEHAVIORAL SYMPTOMS PRODUCED BY SOME ORGANOPHOSPHOROUS COMPOUNDS IN THE SNAIL (HELIX ASPERSA),
Carleton Univ., Ottawa (Ontario). Dept. of Biology.
M. A. Rorke, D. R. Gardner, and R. Greenhalgh.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 417-424, 1974. 3 tab, 15 ref.

Descriptors: *Organophosphorus compounds, *Snails, *Carbamate pesticides, Inhibitors, Enzymes, Organophosphorus pesticides, Organic compounds, Organic pesticides, Toxicity, *Behavior, Animal physiology, Biochemistry, Methodology, Lethal limit, Water pollution effects.
Identifiers: *Cholinesterase, *Helix aspersa, Fenitrothion, Fenitro-oxon, Diethylphenylphosphate, Physostigmine sulphate.

The effects of organophosphorus compounds and the carbamate, physostigmine sulphate, on the snail are investigated. Experimental solutions were applied directly to the foot of the snail; behavior was observed at intervals and LD50 was determined. Two distinct types of behavior were observed suggesting that fenitrothion, fenitro-oxon and diethylphenylphosphate (DEPP) have a common characteristic effect that is not associated with cholinesterase inhibition. Physostigmine produced behavior attributed to cholinesterase inhibition. (Katz)
W74-11483

THE IN VIVO EFFECT OF P,P' DDT ON NA+-K+-ACTIVATED ATPASE ACTIVITY IN RAINBOW TROUT (SALMO GAIRDNERI),
Idaho State Univ., Pocatello. Dept. of Biology.
R. D. Campbell, T. P. Leadem, and D. E. Johnson.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 425-428, 1974. 1 tab, 7 ref.

Descriptors: *DDT, *Rainbow trout, *Salinity, Enzymes, Animal physiology, Biochemistry, Inhibitors, Trout, Pesticides, Laboratory tests, Insecticide, Water pollution effects.
Identifiers: *Na+-K+-ATPase, In vivo tests, Kidney, Gill.

Trout kept in three different salinities were administered DDT in two different concentrations in order to determine the effect of p,p' DDT on Na+, K+-ATPase activity. A relationship between salinity and a propensity for inhibition of the enzyme activity seemed probable in branchial enzyme activity but not in renal enzyme activity. It may be concluded that DDT is capable of inhibiting Na+, K+-ATPase activities in tissues of chronically exposed rainbow trout. Pesticide-salinity interactions exist which are of importance to fish which must adapt to waters of different salinities. (Katz)
W74-11485

SHORT-TERM EFFECTS OF ORGANOPHOSPHATE PESTICIDES ON CHOLINESTERASES OF ESTUARINE FISHES AND PINK SHRIMP,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
D. L. Coppage, and E. Matthews.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 483-488, 1974. 1 tab, 28 ref.

Descriptors: *Organophosphorous compounds, *Pink shrimp, Inhibitors, Shrimp, Minnow, Lethal limit, Enzymes, Biochemistry, Animal physiology, Toxicity, Poisons, Pesticides, Insecticides, Bioassay, Methodology, Water pollution effects.
Identifiers: *Cholinesterases, Malathion, Parathion, Croaker, Spot, Pinfish, Acetylcholinesterase, Enzyme activity, Naled, Guthion, *Organophosphate pesticides.

Four species of estuarine fish and pink shrimp were subjected to short-term exposures of organophosphate pesticides in order to determine the effects on acetylcholinesterase (AChE). Survivors of near median fishkills were assayed for AChE inhibition. Consistent levels of AChE reductions of 70-96% were found, even with different compounds and species. The 'lethal threshold' was found to vary in different species, up to about 80% reduction in AChE activity. Results indicate that measurements of AChE activity and residue analysis woul be useful in determining the cause of 'kills' in the environment. (Katz)
W74-11486

METHOD FOR INDIRECTLY DEFINING OPTIMUM TEMPERATURES OF INHABITANCY FOR MARINE COLD-BLOODED ANIMALS,
Akademiya Nauk SSSR, Leningrad. Zoologicheskii Institut.
A. N. Golikov, and O. A. Scarlato.
Marine Biology, Vol 20, No 1, p 1-5, 1973. 1 fig, 1 tab, 22 ref.

Descriptors: *Temperature, *Mollusks, *Distribution, Aquatic animals, Water temperature, Reproduction, Resistance, Seasonal, Analytical techniques, Mathematical studies, Temperate, *Inhibition, Thermal pollution.
Identifiers: Optimum temperature, Poikilotherm, Collisella ssp., Cold water.

The temperature conditions of existence were analyzed for 7 biogeographical groups of coastal mollusks near the peripheries of their distributional areas. A method is suggested for defining optimum temperatures of inhabitancy and temperatures of reproduction for marine poikilotherm animals. In the Northern Hemisphere, minimum winter temperatures in the North of the distributional areas and maximum summer temperatures in the South often restrict further expansion. The thermal range between summer temperatures in the North of the areas and winter temperatures in the South favors successful reproduction and approaches optimum conditions. The ranges of optimum temperatures of inhabitancy calculated and the temperatures of reproduction are in agreement with data on the spawning temperatures of the same species reported in literature. (Katz)
W74-11487

MERCURY IN STRIPED BASS AND BLUEFISH,
New York Ocean Science Lab., Montauk.
For primary bibliographic entry see Field 5A.
W74-11488

EFFECT OF BLACKFLY LARVICIDING IN SOME ADIRONDACK STREAMS,
New York State Dept. of Environmental Conservation, Albany.
G. E. Burdick, H. J. Dean, J. C. Skea, and C. N. Frisa.
New York Fish and Game Journal, Vol 21, No 1, p 1-17, 1974. 6 tab, 11 ref.

Descriptors: *Insecticides, *Larvicides, *DDT, Insect control, Pesticides, Diptera, Invertebrates, Mayflies, Stoneflies, Benthic fauna, Sampling, Methodology, Statistical models, *New York, Water pollution effects.

Identifiers: *Blackfly, *Arthropods, *Methoxychlor, Trichoptera, Adironduck, Schroon River.

The effect on other stream arthropods of aerial spraying with DDT and methoxychlor for blackfly control was studied on several Adirondack streams, primarily in the Schroon River watershed. Samples were taken from the stream bottom before and at intervals after treatment, and live specimens were recorded and preserved. Weight of the organisms was used as the basis of comparison. A method of comparing all samples to May (first post-treatment samples) weights was devised. The data showed that both DDT (as a 20% solution) and methoxychlor (as a 15% solution) had a significant effect on arthropods other than blackflies in the streams studied. A great reduction in stream productivity was found. (Katz)
W74-11489

ACCUMULATION AND DEPURATION OF MERCURY IN THE AMERICAN OYSTER CRASSOSTREA VIRGINICA,
Delaware, Univ. Dept. of Biological Sciences. Newark.
P. A. Cunningham, and M. R. Tripp.
Marine Biology, Vol 20, No 1, p 14-19, 1973. 3 fig, 2 tab, 14 ref.

Descriptors: *Mercury, *Oysters, *Kinetics, Absorption, Molluscs, Heavy metals, Metals, Bioassay, Analytical techniques, Spectroscopy, Laboratory tests, Statistical methods, Methodology, Pollutants, Water pollution effects.
Identifiers: *Crassostrea virginica, Accumulation, Depuration.

To study the kinetics of mercury uptake in oysters, adult Crassostrea virginica were held in seawater containing 10 microgram/l (ppb) or 100 microgram/l (ppb) mercury as mercuric acetate, for 60 days. Mercury concentration in tissues was determined by analysis of individually homogenized oyster meats, using wet digestion and flameless absorption spectroscopy. After 45 days, average mercury tissue concentration was 140,000 microgram mercury/kg tissue and 28,000 microgram mercury/kg tissue in the 100 ppb and 10 ppb groups, respectively. Clearance of mercury from tissue was studied by exposing treated adults to estuarine water for 30 days (100 ppb group) and 160 days (10 ppb group). Tissue concentrations in the 100 ppb group declined from 115,000 to 65,000 ppb and those from the 10 ppb group declined from 18,000 to 15,000 ppb, in 8 days. No further decline occured in either group. Total self-purification was not achieved over a 6 month cleansing period. (Katz)
W74-11490

EFFECTS OF COPPER AND CADMIUM ON OSMOREGULATION AND OXYGEN CONSUMPTION IN TWO SPECIES OF ESTUARINE CRABS,
National Marine Fisheries Service, Milford Conn. Middle Atlantic Coastal Fisheries Center.
F. P. Thurberg, M. A. Dawson, and R. S. Collier.
Marine Biology, Vol 23, No 3, p 171-175, 1973. 6 fig, 26 ref.

Descriptors: *Crabs, *Copper, *Cadmium, *Oxygen, *Osmosis, Crustaceans, Copper compounds, Salinities, Osmotic pressure, Heavy metals, Metals, Absorption, Laboratory studies, Analytic techniques, Water pollution effects.
Identifiers: *Carcinus maenas, *Cancer irroratus, *Blood serum osmolality, Oxygen consumption.

Green crabs (Carcinus maenas) and rock crabs (Cancer irroratus) were exposed to various concentrations of copper as cupric chloride (CuC12.2H20) and cadmium as cadmium chloride (CdC12.21/2H20) for 48 h. The exposures were conducted at 5 different salinities. At the end of each exposure period, tests of blood-serum osmolality and gill-tissue oxygen consumption were performed. Copper-exposed crabs exhibited loss of osmoregulatory function with increasing copper concentration until normally hyperosmotic serum became isosmotic with the surrounding medium. Cadmium elevated green crab serum above its normal hyperosmotic state. Copper had no effect on gill-tissue oxygen consumption; however, cadmium reduced the role of oxygen consumption in both species tested. (Katz)
W74-11491

ECOLOGICAL IMPACT OF THE IN-LINE ARRANGEMENT OF TWO RESERVOIRS AND A METROPOLITAN AREA,
Drake Univ., Des Moines, Iowa,
W. B. Merkley.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 340, $3.75 in paper copy, $2.25 in microfiche. Iowa Water Resources Research Institute, Ames, Completion Report ISWRRI-53, July 1974. 59 p, 17 fig, 5 tab, 33 ref. OWRT A-045-IA(4), 14-31-001-3815, 14-31-001-3515.

Descriptors: *Invertebrates, Water quality, Ecology, Reservoirs, Urbanization, Rivers, Streams, *Iowa, *Biomass, *Productivity, *Ecological distribution, Systematics, Benthic fauna, *Caddisfilies, *Aquatic insects, Eutropluication.
Identifiers: *Des Moines River(IA), Red Rock Reservoir(IA), Saylorville Reservoir(IA), *Species diversity analysis.

The Army Corps of Engineers is in the final stages of a three phase flood control project on the Des Moines River. When it is completed, the project will consist of two large main stream dams on either side of the city of Des Moines. Among the efforts to assess the ecological impact of this arrangement is an evaluation of the macroinvertebrate community. This evaluation includes: (1) an examination of the structure of the community, (2) biomass and productivity estimates, and (3) species diversity analysis. Invertebrate samples were taken from stations above and below the city and the reservoir using a float device from which were suspended barbeque baskets containing 10 concrete spheres. Comparisons of the stations below the reservoir with those above showed the following differences: (1) a decrease in the number of taxa (from an average of 13 taxa above to 6 below), (2) a decrease in the number of specimens (from an average of 7370/m2 to 3970/m2), (3) a change in the predominant taxa from a caddisfly-mayfly-dipteran assemblage above to an almost complete caddisfly predominance below the reservoir, (4) a remarkably stable annual production estimate (261 g/m2/yr above and 256 g/m2/yr below), and (5) a drop in the average D value from 2.13 above to 1.39 below the reservoir. Collectively the data suggest that there is a gradual degradation of the water quality as it moves to and through the metropolitan area and that the reservoir affects the downstream station such that the stream acts as though it had been exposed to moderate organic enrichment.
W74-11571

AN INVESTIGATION INTO THE EXTENT AND CAUSE OF EUTROPHICATION IN CANYON FERRY RESERVOIR, MONTANA,
Montana Univ., Bozeman. Joint Water Resources Research Center.
J. C. Wright, A. R. Rada, and C. Martin.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 337, $3.25 in paper copy, $2.25 in microfiche. Report No 50 (1974). 35 p, 1 fig, 13 tab, 12 ref. OWRT A-055-MONT(1).

Descriptors: *Eutrophication, *Montana, *Reservoirs, Phosphates, Nitrogen, Daphnia, Cyanophyta, Agricultural watersheds, Zooplankton, Herbivores, Productivity, Phytoplankton, Nutrients, Temperature, Light, Standing crops, Chlorophyll, Influent streams, Effluent streams, Missouri River.
Identifiers: *Canyon Ferry Reservoir(MT), Townsend Valley(MT).

To determine if Canyon Ferry Reservoir has become more productive since 1956-1958, influent and effluent Missouri River water and reservoir water were sampled for nutrients. Streams and reservoir temperatures, light penetration, chemical properties, and phytoplankton standing crop, chlorophyll, zooplankton, and hydrology were also measured. In a comparison to earlier baseline data the 1971-1972 total cell volume, diatom cell volume and Cryptomonad cell volume were less than in 1958. Phosphate concentrations were the lowest observed. Light extinction and blue-green algal cell volume were comparable to 1958 values. Algal bloom concentrations were observed nine times in 1957, three times in 1958 but only once in 1971 and 1972. The areal hypolimnetic oxygen deficit was greater in 1957-58 than in 1971-72. Little difference in zooplankton standing crops was evident in the four years except that the maximal Daphina populations were greater in 1971 and 1972 than in 1957-1958. It is probable that the 1957 conditions reflected the assimilation of terrestrial organic matter following impoundment while the 1958 data may have reflected a transition to a stable state. The indications are that the reservoir was less eutrophic in 1971 and 1972 and the present steady state level of biological productivity should continue during its life. (Auen-Wisconsin)
W74-11573

WATER QUALITY IMPLICATIONS OF CROPLAND NUTRIENTS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6G.
W74-11607

WATER QUALITY IMPLICATIONS OF PESTICIDES,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6G.
W74-11608

WATER QUALITY IMPLICATIONS OF LIVESTOCK PRODUCTION,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6B.
W74-11609

DAMAGE ASSESSMENT OF HOUSEHOLD WATER QUALITY,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
D. P. Tihansky.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE4, Proceedings paper No 10700, p 905-918, August 1974. 7 fig, 1 tab, 32 ref.

Descriptors: *Damages, *Assessments, *Economics, *Environmental engineering, *Water quality control, *Water supply, Estimating, Methodology, River basins, Groundwater, Systems analysis, Equations.
Identifiers: Housing, Households, Mineralized water, Damage functions.

A quantitative method is presented for estimating typical household damages (pecuniary) resulting from mineralized water supply use. The literature is reviewed, and economic data on damages are compiled. For a typical family residence, damages are expressed as the sum of yearly capital expenditures and operation, maintenace, and repair costs for items affected by water use. Nearly 20 household items are assessed, including appliances, water distribution systems, washable

clothing, and soap purchases. Equations are formulated from published data to estimate damages, after which they are depicted graphically for subsequent use by water resource planners. The results are illustrated mathematically as a set of functions defined over various water quality levels. Damage estimates per household are calculated for each state, the relative magnitudes implying that minerals control is likely to achieve its greatest benefits in the midwest and southwest. The contributing role of man's activities to mineral loads in natural bodies is an important factor in setting water quality standards. Economic benefit analyses of pollution control are necessary to insure that future water quality standards improve or enhance social welfare. (Bell-Cornell)
W74-11646

MODELING RADIATION EXPOSURE TO POPULATIONS FROM RADIOACTIVITY RELEASED TO THE ENVIRONMENT,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5B.
W74-11655

CURRENT PROBLEMS IN THE RADIOECOLOGY OF SOILS AND PLANTS,
Safarik Univ., Kosice (Czechoslovakia).
For primary bibliographic entry see Field 5B.
W74-11666

A SURVEY OF PAPERS ON ECOSYSTEMS ANALYSIS FROM 1947-1971 IN THE JOURNAL 'ECOLOGY',
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11668

ECOLOGICAL-ENVIRONMENTAL ASSESSMENTS RELATED TO THE FEDERAL REPOSITORY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11672

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED COMANCHE PEAK STEAM ELECTRIC STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-11674

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED SUMMIT POWER STATION UNITS 1 AND 2 - DELMARVA POWER AND LIGHT COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-11675

POLLUTION AND POISONING,
Southern Illinois Univ., Edwardsville.
For primary bibliographic entry see Field 5B.
W74-11702

TRANSFER OF MERCURY AND CADMIUM FROM TERRESTRIAL TO AQUATIC ECOSYSTEMS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11703

EXPERIMENTAL INVESTIGATIONS ON THE ACCUMULATION OF MERCURY IN WATER ORGANISMS,
National Nature Conservancy Board, Drottningholm (Sweden).
L. Hannerz.
In: Board Report No 48, p 120-176, 1968. 21 fig, 17 tab, 12 ref.

Descriptors: *Absorption, *Model studies, *Aquatic environment, *Mercury, Chemistry, Aquatic plants, Invertebrates, Fish, Metabolism, Food chains, Water pollution, Organic compounds, Testing, Laboratory studies, Radioisotopes, Distribution, Sediments.

The accumulation of methyl mercuric hydroxide, phenyl mercuric acetate, methoxyethyl mercuric hydroxide, mercuric chloride and mercuric nitrate in water organisms was studied with the aid of labelled compounds in pond, tank, and aquarium experiments. Although none of the compounds was taken up to any appreciable degree in the tissues of water plants, the considerable surface adsorption can cause high concentrations in submerged plants. The concentration in animals seemed to be related to several factors including metabolic rate and feeding habits. The concentrations of mercury in invertebrates varied, being highest with methyl mercury and lowest with mercuric chloride. The sediment always had high concentrations, showing a tendency of the mercury towards adsorption on and sedimentation with particles in the pond water. All mercury compounds were taken up in fish both directly from the water and from food. Since uptake greatly exceeded excretion rates large concentrations were found, particularly in the kidneys and liver of the fish. The concentration of electrolytes in the water exerted an influence on the accumulation, and uptake was lower in brackish water than in salt water. (Jerome-Vanderbilt)
W74-11704

HEALTH HAZARDS OF LEAD.
Environmental Reporter: Federal Laws, Sec 31, p 2641-2648, 1972. 7 tab, 62 ref.

Descriptors: *Lead, *Public health, *Human pathology, Toxins, *Air pollution effects, Gasoline, Pollutants, Water pollution sources, Foods.

Sources, occurrence, expected exposure and health effects of lead are discussed. Though the amounts of lead ingested in food and water generally are greater than the amounts inhaled, the body absorbs a greater percentage of inhaled lead (greater than or equal to 30%) than of ingested lead (about 10%). Human blood lead levels are most frequently used as an index of human exposure. The levels begin to rise appreciably with exposure to airborne lead concentrations in excess of 2 micrograms per cubic meter and elevated intake for periods as short as three months produces an increase in blood lead levels. Levels are higher among urban residents and certain occupational groups. The activity of certain enzymes involved in heme synthesis is inhibited when blood levels exceed 40 micrograms/100gm. The clinical manifestations of lead poisoning include combinations of anemia, acute abdominal colic, acute and chronic encephalopathy, peripheral and chronic neuropathy. The syndromes of acute lead poisoning usually resolve following cessation of the exposure to lead and institution of therapy. However, acute encephalopathy in young children is followed by permanent neurological sequelae in at least 25% of the cases. (Jernigan-Vanderbilt)
W74-11706

ALGAL ECOLOGY OF A STREAM POLLUTED THROUGH GOLD MINING ON THE WITWATERSRAND,
University of the Witwatersrand, Johannesburg (South Africa). Dept. of Botany.
F. D. Hancock.
Hydrobiologia, Vol 43, Nos 1-2, p 189-229, 1973. 9 fig, 4 tab, 26 ref, 2 append.

Descriptors: *Mining, *Gold, *Mine drainage, *Algae, *Water pollution, Mine wastes, Streams, Pyrite, Sewage effluents, Sampling, On-site data collections, Laboratory tests, Flow characteristics, Turbidity.
Identifiers: *South Africa(Witwatersrand).

Algal populations of a High Veld stream are examined against the background of mineral and acid pollution derived from sand-dumps and slimes-dams consequent on the gold-mining industry of the Witwatersrand. A rich flora of filamentous Conjugales, desmids and diatoms is found in the originating springs of the Witwatersrand Quartzites. Pollution from sand-dumps raises ionic content and pH and results in the production of only a few tolerant species of diatoms and unicellular chlorophytes which may occur in high numbers. Pollution from slimes-dams is lethal to life in the water. Recovery is initiated by a rise in pH which is brought about by: dilution due to influent water; the lithology of the stream bed changing to that of dolomite limestone and the complete covering of the upper middle reaches by the immense growth of Phragmites communis and other semiaquatics, this, by slowing down the flow of water, enables neutralization and other chemical interactions to take place, sedimentation to be increased and bacterial activity to take place. Pioneer aquatics such a Potamogeton pusillus L. play an important part in creating a micro habitat in which algae can develop. Turbidity at the mouth again prevents the development of algal populations. (Jernigan-Vanderbilt)
W74-11710

TOXICITY FOR CATS OF METHYLMERCURY IN CONTAMINATED FISH FROM SWEDISH LAKES AND OF METHYL-MERCURY HYDROXIDE ADDED TO FISH,
Research Inst. of National Defense, Sundbyberg (Sweden). Dept. of Pathology.
L. Albanus, L. Frankenberg, C. Grant, U. VonHaartman, and A. Jernelov.
Environmental Research, Vol 5, No 4, p 425-442, December, 1972. 2 fig, 8 tab, 34 ref.

Descriptors: *Path of pollutants, *Mercury, *Metabolism, *Animal pathology, *Toxicity, Diets, Water pollution, Pollutants, Biochemistry, Animal physiology, Analytical techniques, Mammals, Furbearers, Laboratory tests, Fish.
Identifiers: *Methylmercury, Cats.

The object was to ascertain whether the methylmercury found in contaminated fish was toxicologically equivalent to a comparable amount of methylmercury salts. Fifteen cats were divided into three groups. The first two were fed a homogenate of pike from a contaminated lake and methylmercury salts added to fish homogenate, respectively at concentrations of 6mg Hg/kg. The third group was used as a control. The exposure period to clinical onset of methylmercury poisoning for both test groups was 60-83 days, with similar neuropathological patterns obvious in both. More than 90% of the mercury was absorbed, of which at least 20% was incorporated into the hair. Mercury levels in the brain constituted about 1% of the total body burden (excluding fur). In the brain and muscle 100% of the mercury was recovered as methylmercury. The results demonstrate that toxicity studies with simple methylmercury salts give results comparable with those obtained with methylmercury naturally accumulated in fish. (Jerome-Vanderbilt)
W74-11711

EFFECT OF MOLYBDENUM STARVATION AND TUNGSTEN ON THE SYNTHESIS OF NITROGENASE COMPONENTS IN KLEBSIELLA PNEUMONIAE,
Wisconsin Univ., Madison. Dept. of Bacteriology.
W. J. Brill, A. L. Steiner, and V. K. Shah.

Journal of Bacteriology, Vol 118, No 3, p 986-989, June, 1974. 2 fig, 2 tab, 17 ref. NSF (GB36787).

Descriptors: *Molybdenum, *Bacteriology, *Metabolism, Metals, *Nitrogen compounds, Laboratory tests, Testing procedures.

Klebsiella pneumoniae M5al grows well in the presence or absence of molybdenum in media containing excess NH4(+). However, growth on N2 is completely dependent on the presence of molybdenum in the medium. Tungstate competes with the molybdate requirement during growth on N2. In molybdenum-depleted medium, neither protein component of nitrogenase is active and neither component can be detected antigenically. These data provide evidence that molybdenum is an inducer of nitrogenase synthesis. (Jernigan-Vanderbilt)
W74-11713

STANDARDS FOR THE PREVENTION OF OCCUPATIONAL LEAD POISONING,
Cincinnati Univ., Ohio. Kettering Lab.
R. A. Kehoe.
Archives of Environmental Health, Vol 23, No 4, p 245-248, October, 1971. 4 ref.

Descriptors: *Lead, *Heavy metals, *Toxicity, *Public health, *Conferences, Pollutants, Human pathology, Inorganic compounds, Water quality standards, Air pollution, *Standards.

A summary is presented of the Conference on Inorganic Lead, Amsterdam, November 28-29, 1968. Certain matters of significance aroused discussion and are worthy of consideration for further investigation. In an industrial plant in which great care is taken to maintain the concentration of airborne particulate lead at a uniform level (approximately 150 micrograms/cu m) in the workrooms, the respiratory exposure of individuals in a group engaged in the same operation in the same area varies considerably. Morphological changes, including nitochondrial swelling and the formation of vacuoles in erythrocytes were described as a feature of the pathological abnormalities of lead poisoning in animals. Concentration of lead in the blood was generally regarded as the most important measure for the control of hazard and for the detection of lead poisoning in the inorganic lead industries. Complex social and personal factors create difficulties in arriving at decisions as to whether workmen should be permitted to continue at work under conditions of exposure to lead, when the analytical results are found to be up to, or above, maximum safe levels. (Jernigan-Vanderbilt)
W74-11714

AEROSOLS OF LEAD, NICKEL, AND CADMIUM,
Cincinnati Univ., Ohio. Kettering Lab.
For primary bibliographic entry see Field 5A.
W74-11716

MERCURY CONTENT OF OREGON GROUNDFISH,
Oregon State Univ., Astoria. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 5A.
W74-11717

WHOLE-BODY AND HAIR RETENTION OF CADMIUM IN MICE, INCLUDING AN AUTORADIOGRAPHIC STUDY ON ORGAN DISTRIBUTION,
Karolinska Institute, Stockholm (Sweden). Dept. of Hygiene.
G. F. Norberg, and K. Nishiyama.
Archives of Environmental Health, Vol 24, No 3, p 209-214, March, 1972. 2 tab, 3 fig, 24 ref.

Descriptors: *Cadmium, *Animal physiology, *Rodents, Distribution, Toxicity, Laboratory tests, Laboratory animals, Analytical techniques, *Pollutant identification, *Bioassay.

This study was designed to show how cadmium is eliminated from the bodies of mice and to see if cadmium concentration in hair correlated with whole-body or organ concentration of the metal. The relationship between concentrations of cadmium in hair and the whole body is of interest when discussing which biological sampling materials could be reliable indicators of cadmium accumulation in the body. When whole-body and hair concentrations of cadmium were followed at regular intervals up to 112 days after an intravenous injection of cadmium chloride tagged with cadmium 109 in mice, a correlation coefficient of .99 was found. Retention of cadmium in different tissues was illustrated by organ assay and whole-body autoradiography and was especially pronounced in the kidneys and pancreas. (Jernigan-Vanderbilt)
W74-11718

ELECTRON MICROSCOPIC STUDY OF CADMIUM NEPHROTOXICITY IN THE RAT,
Kyushu Univ., Fukuoka (Japan). Dept. of Public Health.
M. Nishizumi.
Archives of Environmental Health, Vol 24, No 3, p 215-225, March, 1972. 1 tab, 13 fig, 40 ref.

Descriptors: *Cadmium, *Electron microscopy, *Toxicity, *Rodents, Analytical techniques, Public health, Laboratory tests, Laboratory animals, Human pathology, Pollutant identification.
Identifiers: *Nephrotoxicity.

In rats given drinking water containing cadmium chloride, renal changes evidenced by electron microscopy were confined to the cells of proximal tubules, consisting of two distinct histologic features, increase of lysosomes and swelling of mitochondria. The size and number of lysosomes increased in proportion to the amount of ingestion of cadmium. The usual elongated, rod-shaped mitochondria of the proximal tubular cells became oval or rounded and increased in volume. The cristae were vesicular, shortened, and marginal. There were some other changes, such as increase of microbodies, focal proliferation of the smooth endoplasmic reticulum, and appearance of intranuclear inclusions. These alterations in the proximal tubular cells of cadmium-intoxicated rats indicate an activation of the detoxifying process and impairment of energy metabolism. (Jernigan-Vanderbilt)
W74-11719

BIOLOGIC EFFECT OF METALLIC CONTAMINANTS-THE NEXT STEP,
National Inst. of Environmental Health Sciences, Research Triangle Park, N.C.
D. H. K. Lee.
Environmental Research, Vol 6, p 121-131, 1973. 7 fig, 6 ref.

Descriptors: *Heavy metals, *Trace elements, *Industrial wastes, Public health, Human pathology, Contaminants.

Research on biomedical effects of metallic contaminants has produced far more diversity of information than development of concept. The scope of inquiry has characteristically been element by element without much regard to similarities and contrasts between them. While there has been some systematic review of the various metals, a truly comparative toxicology, or pharmacology, examining the basic molecular behavior in living material, is still wanting. Two areas of deficiency are considered in detail: (1) the relative contributions from different sources to the total impact on man; and (2) relative involvement of physiological mechanisms in response to different metals. An analysis is made of known information about Hg, Pb, and Cd to show similarities, differences, and areas of poor comparative information. To put studies of individual metals in better perspective there is needed: (1) knowledge of the environmental distribution of the metallic compounds, their impact upon the various portals of entry to man, and assessments of total body exposure and (2) detailed comparison of the metabolic fate and pharmacologic responses of various metals and their compounds to provide a more systematic basis for the handling of future toxicologic problems. (Jernigan-Vanderbilt
W74-11720

BIOCHEMICAL RESPONSES TO PROVOCATIVE CHELATION BY EDETATE DISODIUM CALCIUM,
Institute of Industrial Hygiene and Occupational Diseases, Prague (Czechoslavakia).
J. Teisinger.
Archives of Environmental Health, Vol 23, No 4, p 280-283, October, 1971. 5 tab, 11 ref.

Descriptors: *Lead, *Absorption, *Human pathology, *Injection, *Chelation, Exposure, Urine, Industrial wastes, Statistical methods.

The body burden of lead in the intact (living) human adult can be estimated, relatively, for the purposes of preventive medicine, by intravenously injecting 10 ml of a 20% solution of edetate disodium calcium (CaNa2EDTA), after which the total output of the urine during the next 24 hours is collected and analyzed for its lead content. The responses of persons who had been subjected to severe occupational exposure to lead up to the time of the injection were judged to be critical, in terms of undue occupational risk, when the urinary output of lead during the next 24 hours amounted to as much as 2 mg. (Rowe-Vanderbilt)
W74-11723

FATE AND EFFECTS OF OIL POLLUTANTS IN EXTREMELY COLD MARINE ENVIRONMENTS,
California Inst. of Tech., Pasadena. Jet Propulsion Lab.
For primary bibliographic entry see Field 5B.
W74-11725

THE EFFECT OF HEATED WATER ON THE TEMPERATURE AND EVAPORATION OF HYCO LAKE, NORTH CAROLINA, 1966-72,
Geological Survey, Raleigh, N.C.
W. L. Yonts, and G. L. Giese.
Available from NTIS, Springfield, Va 22161, as PB-234 083, Price $3.25 printed copy; $2.25 microfiche. Water-Resources Investigations 11-74, May 1974. 38 p, 14 fig, 6 tab, 5 ref.

Descriptors: *Thermal pollution, *Lakes, *North Carolina, *Evaporation, *Water temperature, Heated water.
Identifiers: *Hyco Lake(NC).

Loading of Hyco Lake, North Carolina, by heat from two steam-electric generators resulted in higher temperatures and increased evaporation. During the winter, local temperature increases of 34 deg F were sometimes observed at the surface as heated water spread out on top of the cooler, more-dense, lake water, affecting areas as large as 2,590 acres with temperature increases averaging up to 12 deg F higher than natural lake temperatures. In the summer average temperature increases at the surface seldom exceeded 6 deg F and the maximum area affected was 2,570 acres. Forced evaporation from the heated part of the Hyco Lake increased in proportion to the added heat, reaching a maximum of 23.1 inches in 1970, as compared to 55.6 inches of natural evaporation for that year. In 1969, over the heated area, 210,600 British thermal units per square foot per year of heat were added to the lake. Of this

amount, about 58% of the heat was utilized for evaporation, 24% for back radiation, 8.0% was conducted as sensible heat from the lake, 1.0% was removed through outflow, and 0.04% was advected by the evaporated water. (Knapp-USGS)
W74-11751

A WATER-QUALITY RECONNAISSANCE OF BIG BEAR LAKE, SAN BERNARDINO COUNTY, CALIFORNIA, 1972-73,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W74-11753

PAUNCH MANURE AS A FEED SUPPLEMENT IN CHANNEL CATFISH FARMING,
Oklahoma Cooperative Fishery Unit, Stillwater.
R. C. Summerfelt, and S. C. Yin.
Copy available from GPO Sup Doc as EP1.23: 660/2-74-046, $1.60; microfiche from NTIS, Springfield, Va 22161 as PB-235 575, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-046, May 1974. 114 p, 12 fig, 30 tab, 50 ref, append. EPA Project R800746 (formerly 12060 HVQ).

Descriptors: *Aquaculture, Water pollution effects, Abatement, Beef cattle, Water quality, *Channel catfish, *Farm wastes, *Fish farming, Fish diets, Recycling.
Identifiers: Channel catfish farming, Fish nutrition, *Paunch manure, Abbattoir wastes, Recycling animal wastes, Slaughterhouse wastes, Food processing wastes.

Part A of this report examines the feasibility of using dried paunch at 10, 20 and 30% levels in feed for pond-rearing yearling channel catfish to market-size, and at a 10% level for cage-culture of yearling catfish. Part B describes the effects of fish culture, using standard feeds and paunch-containing feeds, on water quality of fish ponds. In all, one physical, one bacteriological, and fifteen chemical parameters were measured. Regardless of feed type, pond-reared fish grew faster than the cage-reared fish. There was no significant difference in final weights attained by fish given standard, and 10 and 20% paunch feeds but fish given 30% paunch were significantly smaller. Feed costs per kg of catfish produced using the standard commercial sinking feed and sinking feed containing 10% paunch were essentially equal, but feed costs for making sinking feed with 10 and 20% paunch were greater than the standard. The costs of making a floating feed containing 10% paunch for raceway or cage culture of channel catfish were uneconomical. Neither the pond culture nor the cage culture caused deterioration in water quality in any of the ponds to any appreciable degree in one growing season of 24 weeks, and there was no significant difference in water quality in general between the ponds in which commercial feeds were used and those in which paunch-containing feeds were used--this was true in both pond and cage cultures. (EPA)
W74-11796

SOME NUTRITIONAL CHARACTERISTICS OF SPIRULINA MAXIMA ALGAE GROWN IN EFFLUENTS FROM BIOLOGICAL TREATMENT PLANT,
University of Western Ontario., London. Faculty of Engineering Science.
H. T. Nguyen, N. Kosaric, and M. A. Bergougnou.
Canadian Institute of Food Science Technology, Journal, Vol 7, No 2, p 114-116, April, 1974. 1 fig, 2 tab, 10 ref.

Descriptors: *Cyanophyta, Effluents, *Municipal wastes, Treatment facilities, Biological treatment, Lipids, Carbohydrates, *Proteins, *Amino acids, *Nutrient requirements, Water pollution effects.
Identifiers: *Spirulina maxima.

Spirulina maxima, a high protein blue-green alga, was grown in effluents from a municipal waste treatment plant. The protein content of the algal biomass tended to decrease at the later phase of batch culture while the fat and carbohydrate contents increased. The relative protein amino acid composition did not change and was comparable to that of algae grown in synthetic medium. (Sandoski-FIRL)
W74-11872

UPTAKE OF MERCURIC CHLORIDE AND METHYLMERCURY CHLORIDE FROM LIQUID MEDIA BY ASPERGILLUS NIGER AND PENICILLIUM NOTATUM,
Texas Women's Univ., Denton. Dept. of Chemistry.
J. E. Hardcastle, and N. Mavichakana.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 456-460, May, 1974. 2 fig, 1 tab, 9 ref.

Descriptors: *Mercury, *Soil fungi, Investigations, Environmental effects, Absorption.
Identifiers: *Mercury uptake, *Aspergillus niger, *Penicillium notatum.

The uptake of an inorganic and organic form of mercury by two common soil fungi, Aspergillus niger and Penicillium notatum, were measured. Results indicate that both A. niger and P. notatum have a certain tolerance for mercury and are able to grow and reproduce with certain levels of the element in their tissues. Thus it is suggested that because of their abundance and ability to concentrate mercury, the fungi's role in the metabolism of mercury in the environment is important and should receive further study. (Sandoski-FIRL)
W74-11877

MERCURY CONCENTRATIONS IN TISSUES OF FISH FROM THE CONNECTICUT RIVER,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 5B.
W74-11917

HOW MUCH METAL IS THERE IN OUR WATERS,
For primary bibliographic entry see Field 5B.
W74-11918

CADMIUM - A TRACE ELEMENT OF CONCERN IN MINING AND MANUFACTURING,
For primary bibliographic entry see Field 5B.
W74-11919

BIOLOGICALLY ALLOWABLE THERMAL POLLUTION LIMITS, PART I AND PART II,
Miami Univ., Coral Cables, Fla.
W. Drost-Hansen, and A. Thorhaug.
Copy available from GPO Sup Doc as EP1.23:660/3-74-003, $1.20; microfiche from NTIS, Springfield, Va 22161 as PB-235 715, PC$3.20/$2.25 MF. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-003, May 1974. 80 p, 9 fig, 1 tab, 30 ref. EPA Project 18050 DET, Program Element 1BAO22.

Descriptors: *Environmental effects, *Molecular structure, Physicochemical properties, *Temperature, Thermal properties, Water structure, Ecology, Food chains, *Thermal pollution, Pink shrimp, Crabs, Aqueous solutions, *Growth rate, *Heat resistance, Interfaces, Colloids, Electrolytes, Enthalpy, Entropy, Enzymes, Hydration, Hydrogen bonding, Lipids, Membranes, Metabolism, Proteins, Water pollution effects.
Identifiers: Halimeda, Penicillus, Valonia, Crab megalops.

Literature and theoretical studies have demonstrated the likely existence of critical thermal transition regions for biological activity. Highly nonlinear thermal effects appear to be manifestations of higher-order phase transitions most likely in the vicinal water of the cellular systems. The effects are likely invariants in time and space. Thus, the corresponding critical temperature regions may represent absolute, upper permissible thermal pollution limits. Laboratory experiments, using some 18,000 individuals have yielded the most accurate thermal tolerances to date for marine estuarine organisms (including macro-algae and larval stages of important food-chain organisms). Gaussian (or skewed-Gaussian) curves for lethal thermal limits were not observed. Instead an abrupt death point occurred, often within an interval of 0.5 to 1C. The temperature tolerances obtained in the laboratory conformed closely to those observed in the field. Thus upper limits found in the laboratory for Halimeda, Penicillus, and Valonia were found to be the thermal limits in the field. At Turkey Point, these plants disappeared above the thermal limits. The upper temperature limit for many of the plants examined, as well as the sensitive stage of the pink shrimp, crab megalops and several carideans, was 31 to 33C. This critical temperature region is within 1 to 3C of mean mid-summer temperatures substantiating the hypothesis that tropical marine organisms live closer to their upper lethal limit than do either temperate or Arctic species. (EPA)
W74-11921

THE RELATION BETWEEN WATER QUALITY AND THE STATUS OF FISH POPULATIONS IN WILLOW BROOK,
Water Pollution Research Lab., Stevenage (England).
J. F. de L. G. Solbe.
Water Treatment and Examination, Vol 22, Part 1, p 41-61, 1973. 9 fig, 2 tab, 21 ref.

Descriptors: *Water pollution effects, *Water quality, *Fish populations, *Lethal limit, Streams, Methodology, Analytical techniques, *Toxicity, Water chemistry, Metals, Pollutants, Spectropotometry, Zinc, Ammonia, Phenols, Cadmium, Detergents, Mercury, Distribution, Salmonids, Fisheries.
Identifiers: *Roach, Willow Brook(England), LC50, Salmo ssp., Rutilus rutilus, Detoxification.

The predicted acute lethal toxicity to rainbow trout of the water in the polluted Willow Brook, Northamptonshire, over a 25-month period has been used to describe the water quality. Toxicity varied greatly from day to day but regular seasonal variations were demonstrated in the lower reaches. It was greatly reduced as the water passed downstream, particularly as it passed through two upper lakes. A general relation was found between temperature and reduction in toxicity in the lower streams. Zinc was the predominant poison, ammonia and phenol being only occasionally important in the upper streams. Fish were found upstream of the polluting discharges and were absent for several kilometers downstream. Deene Lake supported 3 species and the number increased to ten 18 km below. (Katz)
W74-11932

EFFECT OF RATE AND DURATION OF FEEDING DDT ON THE REPRODUCTION OF SALMONID FISHES REARED AND HELD UNDER CONTROLLED CONDITIONS,
New York State Dept. of Environmental Conservation, Albany.
G. E. Burdick, H. J. Dean, E. J. Harris, J. Skea, and R. Karcher.
New York Fish and Game Journal, Vol 19, No 2, p 97-115, July 1972. 17 tab, 6 ref.

Descriptors: *Fish reproduction, *Fishkill, *Toxicity, *Mortality, *Pesticides, *DDT, *Brook trout, *Brown trout, Trout, Salmonids, Immature growth stage, Juvenile fish, Viability, Fish eggs, Fish hatcheries, Reproduction, DDE, Statistical models, Water pollution effects, Chromatography.

Losses of fry during various periods of development are compared for brown trout and brook trout hatched from eggs taken from females fed DDT at different concentrations and for various lengths of time, and for control fish fed no DDT. Significant differences were determined statistically and only one period, from swim-up (i.e. when hatchery feeding is normally begun) for a specified time thereafter, showed significant losses. This was dependent on the time DDT was fed before spawning, and the weekly dosage in milligrams per kilogram of body weight. DDT was confirmed as the cause of approximately 100% mortality of lake trout fry reared from eggs taken after adding 6 mg/kg of DDT to the weekly diet of potential breeders. (Katz)
W74-11933

TRACE METALS IN NEW YORK STATE FISH,
Corning Glass Works, Research and Development Lab., N.Y.
S. C. Tong, W. H. Gutenmann, D. J. Lisk, G. E. Burdick, and E. J. Harris.
New York Fish and Game Journal, Vol 19, No 2, p 123-131, July 1972. 1 fig, 4 tab, 13 ref.

Descriptors: *Heavy metals, *Freshwater fish, *Zinc, *New York, Nickel, Cobalt, Cadmium, Mass spectrometry, Analytical techniques, Bioassay, Carp, Lake trout, Bass, Perches, Absorption, *Trace elements, Pikes, Walleye, Lake Erie, Lake Ontario, Hudson River, St. Lawrence River, Pollutant identification.
Identifiers: Silver, Tin, Vanadium, Barium, Crappie, sturgeon, Muskallange, Striped bass, Lake Champlain, Lake Cayuga.

An analytical survey was conducted of the concentrations of eight metals in fish from 11 New York state waters. Analysis of barium, cadmium, cobalt, nickel, silver, tin, vanadium, and zinc in fish was performed by spark source mass spectrometry following dry ashing of samples. Barium, cadmium and silver were present in the range of 0.1 ppm. Tin and zinc were usually found at relatively higher levels of 0.5 to several ppm. Cobalt, nickel and vanadium were intermediate in concentration being most often less than 1 ppm. (Katz)
W74-11934

THE EFFECTS OF TOTAL DISSOLVED SOLIDS, TEMPERATURE, AND PH ON THE SURVIVAL OF IMMATURE STRIPED BASS: A RESPONSE SURFACE EXPERIMENT,
North Carolina Cooperative Fishery Unit, Raleigh.
W. D. Davies.
The Progressive Fish-Culturish, Vol 35, No 3, p 157-160, July, 1973. 2 fig, 1 tab, 7 ref.

Descriptors: *Statistical models, *Temperature, *Hydrogen ion concentration, *Striped bass, Fish hatcheries, Model studies, Regression analysis, Fish establishment, Juvenile fish, Methodology, Analytical techniques, Laboratory tests, Dissolved solids.
Identifiers: *Morone saxatilis, *Response surface model.

With hopes for establishing a successful striped-bass fishery, the survival response of striped bass (Morone saxatilis) fry to various combinations of temperature, pH and total dissolved solids were determined, along with optimum conditions. Response surface methods are utilized for analytical purposes. Optimum conditions, calculated from a regression equation, are 63.6F, pH 7.5 and total dissolved solids 185.7 measured as Mg/l NaCl. (Katz)
W74-11935

SURFACE AGITATORS AS A MEANS TO REDUCE NITROGEN GAS IN A HATCHERY WATER SUPPLY,
Dworshak National Fish Hatchery, Ahsahka, Idaho.
Einar Wold.
The Progressive Fish-Culturist, Vol 35, No 3, p 143-146, July, 1973. 3 fig, 1 tab, 11 ref.

Descriptors: *Aeration, *Supersaturation, *Nitrogen, Gases, Pathology, Water quality, Fish hatcheries, Technology, Water quality control, Oxygenation, Dissolved oxygen, Water treatment, Methodology, *Idaho, Treatment facilities, Rainbow trout, Water pollution effects.
Identifiers: *Gas bubble disease, *Degassers, Surface agitators, Orchorhynchus sp.

High nitrogen saturation levels have been proven harmful to fish, and some means to reduce the level to less than 105% is necessary to maintain a healthy hatchery stock. Dworshak National Fish Hatchery, located 1.6 miles below Dworshak Dam on the Clearwater River, Idaho, constructed a water treatment facility to provide a settling basin and aeration facility for low oxygenated reservoir water. Surface mechanical agitators originally installed as aerators successfully reduced nitrogen from 115-130% saturation to levels acceptable for fish culture purposes. The aerators are described. (Katz)
W74-11936

ENVIRONMENTAL EVALUATION BASED ON RELATIVE GROWTH RATES OF FISHES,
Tulane Univ., New Orleans, La. Dept. of Biology.
G. E. Gunning, and A. V. La Nasa.
The Progressive Fish-Culturist, Vol 35, No 2, p 85-86, April, 1973. 1 tab, 3 ref.

Descriptors: *Water quality, *Growth rate, Water pollution control, Analytical techniques, Bioindicators, Water pollution effects, Water pollution sources, Dissolved oxygen, Sewage effluents, *Alabama, Pulp wastes.
Identifiers: *Notropis venustus, Environmental evaluation, Pearl River(Ala), Kraft mill.

A quick and definitive method of environmental evaluation was suggested by comparing the relative growth rates for fishes occupying polluted and unpolluted areas in the same river. Three stations for fish collecting were located above and below polluting sources on the Pearl River. The blacktail shiner (Notropis venustus) was collected and checked for growth rate. The growth rate was greater in fish collected above the points of effluent discharge than in fish collected from polluted waters. This study indicates that one can conduct a short-term study of the growth rate of a single species of fish in order to obtain an overall indication of environmental quality. (Katz)
W74-11937

MASS STRANDING OF MOLLUSCS AT TE WAEWAE BAY, SOUTHLAND, NEW ZEALAND,
Ministry of Agriculture and Fisheries, Wellington (New Zealand). Fisheries Research Div.
D. Eggleston, and R. W. Hickman.
New Zealand Journal of Marine and Freshwater Research, Vol 6, No 3, p 379-382, September, 1972. 2 fig, 1 tab, 7 ref.

Descriptors: *Fishkill, *Molluscs, *Temperature, Weather, Salinity, Mortality.
Identifiers: *Stranding, *Mactra discors, Resania lanceolata, Toheroa, Cold water, *New Zealand.

A stranding of shellfish on the beach at Te Waewae Bay, Southland, occurred during very cold, stormy weather in September 1970. More than 20 million shellfish were stranded, the majority being Mactra discors Gray. It is suggested that the cause was a combination of strong inshore winds and low temperatures, coupled with an increased flow of fresh, cold water across the beach. Water temperatures and salinity dropped, reducing the activity of the animals and their ability to counteract the effects of the heavy sea. (Katz)
W74-11938

SUMMERTIME ARTIFICIAL AERATION INCREASES WINTER OXYGEN LEVELS IN A MICHIGAN LAKE,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
A. W. Fast.
The Progressive Fish-Culturist, Vol 35, No 2, p 82-84, April, 1973. 1 tab, 11 ref.

Descriptors: *Winterkilling, *Aeration, *Lakes, *Oxygen, Eutrophication, Fishkill, Mortality, Freezing, Limnology, Oxygenation, Dissolved oxygen, Photosynthesis, Iced lakes, Summer, Seasonal, Organic matter, Thermal stratification, Destratification, *Michigan, Reaeration.

Artificial aeration of eutrophic lakes to prevent winterkill is generally conducted immediately prior to or during ice and snow cover. This study involved summertime aeration only and the effects of this on winter oxygen levels were examined. Significant increases in the winter oxygen concentrations were found after 2 months of summertime aeration. The increase was from O mg/l 02 at 7.5 meters to 6.5 mg/l O2 at 7.5 meters. This is attributable to an increase in the oxygen reserve at ice formation and a reduction in the amount of decomposable organic matter as a result of the aeration. Artificial aeration during summer, fall or winter may prevent winterkill. (Katz)
W74-11939

EFFECTS OF WATER REUSE ON RAINBOW TROUT IN HATCHERIES,
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
J. D. Larmoyeux, and R. G. Piper.
The Progressive Fish-Culturist, Vol 35, No 1, p 2-8, January, 1973. 8 fig, 3 tab, 13 ref.

Descriptors: *Rainbow trout, *Fish hatcheries, *Water quality, *Water reuse, *Ammonia, *Dissolved oxygen, Trout, Salmonids, Growth rates, Animal physiology, Metabolism, Mortality, Cytological studies, Pathology, Laboratory tests, Microscopy, Aeration, Bioassay, Behavior, Toxicity.
Identifiers: Blood serum, Hematocrits, Histology, Gills, Kidney, Liver.

Fish hatcheries often reuse water through a series of ponds. Fish metabolism reduces oxygen and adds metabolic products to the water. Aeration between ponds can increase oxygen but metabolic products remain. The effects of this reused water on growth, mortality and physiology of rainbow trout were examined in laboratory tests. Results indicated that a decline in fish quality, as evidenced by reduction in growth rate, damage to gill tissue, and occasional pathology in kidney and liver tissue, occurred when oxygen levels fell below 5 ppm and ammonia levels exceeded 0.5 ppm. (Katz)
W74-11940

A DEVICE FOR ALLEVIATING SUPERSATURATION OF GASES IN HATCHERY WATER SUPPLIES,
Bureau of Sport Fisheries and Wildlife, Boston, Mass.
B. A. Dennison, and M. J. Marchyshyn.
The Progressive Fish-Culturist, Vol 35, No 1, p 55-58, January, 1973. 2 fig, 1 ref.

Descriptors: *Supersaturation, *Water quality control, Fish hatcheries, *Aeration, Growth rates, Saturation, Design data, Technology, Water pollution sources, Mortality, Dissolved oxygen, Oxygen, Gases, Water pollution effects.
Identifiers: *Degassers.

Supersaturation of gases in hatchery water can be detrimental to fish survival and growth. A unit is described in detail which has proved highly effective in reducing oxygen and, presumably, nitrogen to saturation levels. Specifications are given for its

construction. This device is equally effective in aerating unsaturated waters. (Katz)
W74-11941

PRELIMINARY STUDIES USING SYNTHETIC POLYMERS TO REDUCE TURBIDITY IN A HATCHERY WATER SUPPLY,
Alchesay National Fish Hatchery, Whiteriver, Ariz.
W. H. Olson, D. L. Chase, and J. N. Hanson.
The Progressive Fish-Culturist, Vol 35, No 2, p 66-73, April, 1973. 8 fig, 3 tab, 8 ref.

Descriptors: Technology, *Turbidity, *Fish hatcheries, *Flocculation, *Water purification, *Water treatment, Desilting, Quality control, Water pollution effects, Methodology, Feeding rates, Rainbow trout, Cytological studies, Microscopy.
Identifiers: Purifloc, Synthetic polymers, Gills, Histology.

Turbidity in hatchery water is closely integrated to fish feeding activities and the subsequent conversion ratio of pounds of feed fed per pound of weight gain. A model water clarification system was tested using synthetic polymers to flocculate and remove suspended materials from the water. Different flocculants were used and a dual treatment with Purifloc A-23 and Purifloc A-31 was found to be the most effective. Biological effects of polymer-treated water as compared to untreated turbid water were examined and no adverse effects were noted in fish reared in treated water. Fish in untreated water of high turbidity lost weight and became inactive. (Katz)
W74-11942

EFFECTS OF HATCHERY WATER REUSE ON RAINBOW TROUT METABOLISM,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
F. L. Mayer, Jr., and R. H. Kramer.
The Progressive Fish-Culturist, Vol 35, No 1, p 9-10, January, 1973. 1 tab, 4 ref.

Descriptors: *Fish hatcheries, *Metabolism, *Rainbow trout, *Water reuse, Fisheries, Water quality, Quality control, Trout, Sport fish, Water pollution effects.
Identifiers: Scope for activity, Active metabolism.

Scope for activity, as an index of the fitness of hatchery trout, and the effects of hatchery water reuse were tested on rainbow trout. Scope for activity is the amount of oxygen available for activity and is expressed as the arithmetic difference between active and standard rates of oxygen consumption. It is hypothesized that fish with a higher scope for activity will have a better chance for survival when released into a stream environment. Active metabolism rates were reduced at the rate of 39 mg O2/kg per hour each time the water was reused. Decrease in scope of activity was related directly to this. If survival rate of fish stocked in stream environments is directly related to scope for activity, it is advisable to stock streams with fish cultured in a minimum of reused water. (Katz)
W74-11943

EFFECTS OF HYDROELECTRIC DEVELOPMENT IN WESTERN CANADA ON AQUATIC ECOSYSTEMS,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Biological Sciences.
G. H. Geen.
Journal of the Fisheries Research Board of Canada, Vol 31, No 5, p 913-927, May, 1974. 4 fig, 48 ref.

Descriptors: *Hydroelectric power, *Salmon, *Canada, *Water pollution effects, *Ecosystems, Electric power industry, Lakes, Environmental effects, Water chemistry, *Thermal pollution, Turbidity, Reservoirs, Supersaturation, Salmonids, Sport fish, Benthic fauna, Chinook salmon, Pink salmon, Sockeye salmon, Food chains, Anadramous fish, Rainbow trout, Sediments, Temperature.
Identifiers: British Columbia, *Onchorynchus ssp.

The effects of some existing and proposed hydroelectric developments on lakes and rivers in Western Canada are considered. There are few pre- and postimpoundment studies from this region on which to base generalizations, although the changes in species composition and water chemistry following impoundment of rivers and lakes reported thus far are comparable to those observed in other areas at similar latitudes. Few data are available which permit prediction of thermal regimes in newly formed reservoirs, particularly in view of the turbid nature of some inflows to reservoirs. Several hydroelectric developments have blocked or impeded migrations of economically important fish and appear likely to produce a number of downstream changes in water temperature or composition, the effects of which are often speculative. More studies of the effects of altered temperature and flow regimes, reduced turbidity and gas supersaturation are required. (Katz)
W74-11944

HIGH ZINC CONCENTRATION IN COMMON CARP VISCERA,
Academia Sinica, Taipei (Taiwan). Inst. of Zoology.
S. S. Jeng, and H. W. Lo.
Bulletin of the Japanese Society of Scientific Fisheries (Nippon Suisan Gakkaishi), Vol 40, No 5, p 509, May, 1974. 2 tab, 2 ref.

Descriptors: *Carp, *Zinc, *Absorption, Bioassay, Water pollution effects, Water pollution sources.
Identifiers: *Cyprinus carpio, Kidney, Digestive tract, *Taiwan.

The concentration of zinc in the common carp is much higher, by a factor of ten, than in all other fish cultured in Taiwan. The concentration of zinc in the digestive tract and kidney was 15 times higher than in any other fish, at about 300 ppm. The reasons for this are unknown. (Katz)
W74-11946

FACTORS INFLUENCING FORMALIN TOXICITY IN TROUT,
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
R. G. Piper, and C. E. Smith.
The Progressive Fish-Culturist, Vol 35, No 2, p 78-81, April, 1973. 3 tab, 12 ref.

Descriptors: *Toxicity, *Pesticides, *Rainbow trout, *Fish hatcheries, Fishkill, Mortality, Water quality, Temperature, Biocontrol, Parasitism, Pest control, Metabolism, Water chemistry, Brook trout, Channel catfish, Water pollution effects.
Identifiers: *Formalin.

Formalin is an effective treatment in the control of various external fish parasites, but sometimes causes high fish losses. Data on the effects of water quality and other factors on the toxicity of formalin from 72 fish hatcheries are examined. Rainbow trout were found to be the predominant problem species and water chemistry was found to have no correlation with incidence of formalin toxicity. Error in treatment was found to cause excessive mortality; water temperature was a notable factor in mortality; and two workers indicated that pretreatment starvation alleviated mortalities. (Katz)
W74-11947

OIL POLLUTION MONITORING IN THE LAGOON OF VENICE USING THE MUSSEL MYTILUS GALLOPROVINCIALIS,
Instituto di Biologia del Mare, Venice (Italy).
V. U. Fossato, and E. Siviero.
Marine Biology, Vol 25, No 1, p 1-6, July, 1974. 1 tab, 2 fig, 13 ref.

Descriptors: *Mussels, *Bioindicators, *Oil pollution, Water pollution sources, Bioassay, Absorption, Monitoring, Oil wastes, Industrial wastes, Fuels, Mollusks, Benthos, Analytical techniques, Gas chromatography, Pollutant identification.
Identifiers: *Mytilus galloprovincialis, Aliphatic hydrocarbons.

Gas chromatographic analyses of mussels from different areas of the Lagoon of Venice show that these organisms contain a very complex mixture of hydrocarbons attributable to fuel oil contamination. The measured amounts normally range from 0.8 to 8.7 mg/100g wet weight, but values as high as 22.0 mg/100g were recorded. This high value indicates a saturation limit for these organisms which is considerably higher than those values normally found in mussels from the lagoon. The aliphatic hydrocarbon levels in mussels are related to distance from pollution sources and to the degree of the exchange between the sea and the area sampled. On the basis of this relationship between overall hydrocarbon pollution load and level of pollution of the mussel, it appears that this bivalve might be effectively utilized as a self-integrating monitoring index of oil pollution in the waters of the lagoon. (Katz)
W74-11948

SOME OBSERVATIONS ON THE INTERACTIONS OF MARINE PROTOZOA AND CRUDE OIL RESIDUES,
University Coll. of North Wales, Menal Bridge. Marine Science Lab.
A. R. Andrews, and G. D. Floodgate.
Marine Biology, Vol 25, No 1, p 7-12, July, 1974. 4 fig, 1 tab, 9 ref.

Descriptors: *Oil, *Protozoa, *Digestion, Microorganisms, Laboratory tests, Microscopy, Microbiology, Sea water, Methodology, Nematodes, *Absorption, Water pollution effects.
Identifiers: *Crude oil residues, Bodo.

Marine protozoa were observed to take up Kuwait crude oil residues in the laboratory and the field. The oil was only found to be ingested in the presence of a suitable food substance, including bacteria adhering to partially degraded oil globules. Little is known about the digestion of mineral oils by protozoa. (Katz)
W74-11949

SALINITY AND TEMPERATURE TOLERANCE OF ZOEAE OF THE PORTUNID CRAB SCYLLA SERRATA,
Rhodes Univ., Grahamstown (South Africa). Dept. of Zoology.
B. J. Hill.
Marine Biology, Vol 25, No 1, p 21-24, July, 1974. 1 fig, 7 ref.

Descriptors: *Crabs, *Immature growth stage, Temperature, *Salinity, Larvae, Larval growth stage, Resistance, Mortality, Thermal stress, Sea water, Water pollution effects, *Africa.
Identifiers: *Scylla serrata, *Zoeae, Lower limit, *Temperature tolerance.

The tolerances of the first zoeal stage of the crab Scylla serrata have been investigated in 61 different temperature-salinity combinations. Exposure to temperatures above 25C or to salinities below 17.5 parts per thousand caused considerable mortality; therefore, zoeae are unsuited to estuarine conditions. The larvae can tolerate temperatures down to 5C, but they are inactive below 10C. It is suggested that 10C is probably a lower limit and that female crabs which migrate to sea to release their eggs do not enter water with a temperature below 12C. Hydrological conditions along the south-east coast of Africa indicate that females would, therefore, migrate less than 10 km offshore. (Katz)

W74-11950

ALKANES AND ALKENES IN MARINE BENTHIC ALGAE,
Florida Technological Univ., Orlando. Dept. of Chemistry.
W. W. Youngblood, and M. Blumer.
Marine Biology, Vol 21, No 3, p 163-172, 1973. 2 fig, 9 tab, 25 ref.

Descriptors: *Organic compounds, *Benthic flora, Biochemistry, Benthos, *Marine algae, Marine plants, Bioassay, Oil, Analytical techniques, Gas chromatography, Mass spectrometry, Metabolism, Oil pollution, Chemistry, Phaeophyta, Chlorophyta, *Massachusetts, Water pollution effects, Pollutant identification.
Identifiers: Olefins, Polyolefines, Fuccus ssp, Ascophyllum ssp, *Alkanes, *Alkenes, HEH isomers, Fatty acids, *Cape Cod(MA).

Saturated and olefinic hydrocarbons were determined in several species of benthic marine algae from the Cape Cod area. The distribution of homologous and isomeric olefins was studied in plants of different age and in morphologically different parts of the same specimen. Methylene-interrupted C19- and C21- polyolefins are particularly abundant; delta (1)-heneicosahexaene and the corresponding pentaene are common to all brown algae, while the corresponding delta (3) -isomers occur in green algae. Hydrocarbon concentration, the alkene-to-alkane ratio and the polyolefin content are highest in young plants or in rapidly growing tissues of older plants. This suggests a deeper involvement in cell biochemistry of straight-chain hydrocarbons than previously considered. The biosynthesis of the plant polyolefins remains to be explored. The hydrocarbon composition of these benthic algae differs greatly from that of fossil fuels in its simplicity and predominately unsaturated nature. The separation of the isomers by gas chromatography and mass spectrometry are discussed. (Katz)
W74-11951

RESPONSE OF ASTERIAS VULGARIS TO CHEMICAL STIMULI,
Woods Hole Oceanographic Institution, Mass.
O. Zafiriou.
Marine Biology, Vol 17, No 2, p 100-107, 1972. 3 tab, 16 ref.

Descriptors: *Crustaceans, *Attractants, *Repellents, Behavior, Ureas, Methodology, Bioassay, Laboratory tests, Water pollution effects, Hydrogen ion concentration.
Identifiers: *Asterias vulgaris, *Sea stars, *Chemical stimuli, Lactic acid, Handsweat.

Groups of the sea star, Asterias Vulgaris, approached a variety of chemical stimuli in a flow tank. Urea, lactic acid, succinic acid, and 'handsweat' were attractive to some animals; some simple acids and amino acid mixtures were weakly attractive; pH changes and seawater salts were not attractive. Although the groups were similarly maintained and responded with high internal consistency, they differed in responsiveness to different substances. These variations are not easily accounted for as contamination or effects of prior animal experience. Asterias Vulgaris detects many simple organic substances, but the behavioral response is not constant and species-wide; it depends on non-chemical factors. This sensory/behavioral mode presumably suits a non-specialist predator, and may be widespread among similar asteroids. Individuals attracted to lactic acid could be induced to cling to and evert their stomachs over a sponge soaked in lactic-acid solutions. The chemicals found attractive in this study do not account for most of the attractiveness of shellfish tissue extracts studied previously. (Katz)
W74-11952

THE PRESENT AND FUTURE SITUATION OF NUCLEAR ENERGY PRODUCTION AND ITS ASSOCIATED INDUSTRY--NORMAL OPERATION, ACCIDENT PREVENTION AND MITIGATION, COMPARATIVE RISK ASSESSMENT,
Directorate-General for Industrial, Technological and Scientific Affairs. Commission of the European Communities, Brussels (Belgium).
W. Vinck, H. Boos, F. Luykx, H. Maurer, and J. V. Caeneghem.
Available from European Community Information Service, 2100 M St., N.W., Suite 707, Washington, D.C. Report EUR-5001 d, e, f, n., 1973. 60 p, 11 tab, 98 ref.

Descriptors: *Assessment, *Forecasting, *Nuclear energy, *Nuclear powerplants, *Nuclear reactors, *Nuclear wastes, Sites, Safety, Environment, Radioactivity, Hazards, Effluents, Water pollution, Public health, Food chains, Environmental effects.
Identifiers: *Fuel reprocessing.

An outline is presented of the present status and of the future trends in nuclear energy development in the six Member States of the European Community and in the frame of its future enlargement. Emphasis is placed upon the technical safety aspects, the siting and environmental considerations and the implications for mankind as compared to conventional hazardous industries. The radioactive effluents routinely released at present by nuclear power and reprocessing plants are investigated and the future increase estimated on the basis of: (1) The second Community Target Nuclear Programme; (2) typical BWR and PWR releases, and (3) the nuclear capacity installed assuming that half of it is of the PWR type and the other half of the BWR type. It was found that only the noble gas releases in the gaseous effluent streams give rise to special supplementary precautions, justified not really by global effects through gradual buildup in the biosphere and the atmosphere, but rather by local or regional effects in the vicinity of the plants. Finally, it is concluded that at present the record of the nuclear power industry is, compared to conventional hazardous industries, extremely favourable from the point of view of human injury from gaseous and effluent releases for the professionally exposed as well as for the general public. (Houser-ORNL)
W74-11953

ENVIRONMENTAL MONITORING REPORT, PERIOD COVERING MAY 1, 1973 THROUGH JULY 31, 1973 FOR EL PASO NATURAL GAS COMPANY.
Eberline Instrument Corp., Santa Fe, N. Mex. Santa Fe Lab.
For primary bibliographic entry see Field 5B.
W74-11954

ENVIRONMENTAL CONTROL IN NUCLEAR FUEL REPROCESSING,
Emory Univ., Atlanta, Ga.
For primary bibliographic entry see Field 5B.
W74-11955

ASSESSING POTENTIAL RADIOLOGICAL IMPACTS TO AQUATIC BIOTA IN RESPONSE TO THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) OF 1969,
Oak Ridge National Lab., Tenn.
S. V. Kaye.
Available from NTIS, Springfield, Va., 22161 as CONF. 730503-2; $4/copy, $2.25 microfiche. In: Environmental Behaviour of Radionuclides Released in the Nuclear Industry: CONF 730503, Proceedings of Conference AIX-EN Provence, France, May 14, 1973. International Atomic Energy Agency, Vienna, p 149-661, 1973.

Descriptors: *Nuclear powerplants, *Radioactivity, *Effluents, *Streams, *Surface waters, *Water pollution, Environment, Environmental effects, Aquatic life, Aquatic animals, Aquatic plants, Fish, Biota, Cesium, Cobalt, Strontium, Manganese.

Assessment of impacts for nuclear power stations sited near bodies of water receiving reactor effluents indicates that aquatic biota may receive higher doses than do terrestrial biota and that potential doses due to internal deposition of radionuclides may be several hundred times greater than potential external doses from immersion in contaminated water. Estimated doses are listed in each environmental impact statement for aquatic plants, invertebrates (crustaceans and molluscs), and fish. Where appropriate, doses are also estimated for waterfowl, shore birds, or muskrats. A steady-state bio-accumulation factor (concentration of radionuclide in biota-concentration of radionuclide in water) is used to estimate the body burden of each radionuclide for calculating internal dose. In most cases, site specific bioaccumulation factors are not available, and literature values, which usually cover a wide range, must be considered for the calculations. The radionuclides released from water-cooled reactors to the aquatic system differ from plant to plant, depending upon the type of radioactive waste cleanup system, but the most important dose-contributing radionuclides are usually Cs-134 and Cs-137. Radionuclides of lesser importance are Co-58, Co-60, Sr-90, Sr-91, and Mn-54. (Houser-ORNL)
W74-11957

EFFECTS OF SEPTIC TANK EFFLUENT ON GROUNDWATER QUALITY, DADE COUNTY, FLORIDA: AN INTERIM REPORT,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-11975

ASSESSMENT OF THE ECOLOGICAL CONSEQUENCES OF HERBICIDE USE ALONG TRANSMISSION LINE RIGHTS-OF-WAY AND RECOMMENDATION FOR SUCH USE,
Argonne National Lab., Ill.
J. D. Buffington.
Available from NTIS, Springfield, Va 22161 as ANL/ES-34, Price $4.00 printed copy; $2.25 microfiche. Environmental and Earth Sciences Report ANL/ES-34, April 1974. 44 p, 6 fig, 3 tab, 90 ref. AEC Contract W-31-109-Eng-38.

Descriptors: *Herbicides, *Brush control, *Ecology, *Environmental effects, Water pollution sources, Powerline carriers, Transmission lines.

The ecological effects of use of herbicides to maintain transmission line rights-of-way are reviewed. Vegetation management programs presented to the U.S. Atomic Energy Commission as part of a license application involve the use of 2,4-D, 2,4,5-T, silvex, picloram, and dicamba. Review of the literature dealing with these herbicides leads to the conclusion that they should be regarded as hazardous substances which may be used to society's benefit for vegetation management along transmission lines only so long as reasonable precautions are followed. A series of recommendations is included which, if followed, should prevent unacceptable environmental damage and hazard to human health. (Knapp-USGS)
W74-11977

5D. Waste Treatment Processes

METROPOLITAN WATER INTELLIGENCE SYSTEMS--COMPLETION REPORT, PHASE III,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg, J. W. Labadie, and H. G. Wenzel.

Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 532; $6.75 in paper copy, $2.25 in microfiche. Completion Report, June 1974. 258 p, 50 fig, 19 tab, 151 ref, append. OWRTC-4172(9028)(4).

Descriptors: *Control systems, *Sewers, *Storm runoff, *Overflow, *Optimization, *Information systems, Water pollution control, Storage, Detention, Reservoir operation, Mathematical models, Dynamic programming, Automatic control, Systems analysis, Cities, Institutional constraints. Identifiers: *Combined sewer systems, *Mathematical programming, Optimal control theory, Control logic, Urban water systems.

The results of the three phases of the Colorado State University project 'Metropolitan Water Intelligence Systems' (MWIS) are reported. The special type of MWIS considered is the fully automated control system for combined sewer systems. The report principally contains technical data on the solution of the control strategy problem and on optimization techniques for developing control logic. The socio-political problems associated with implementing a MWIS are discussed as well as the problems facing local decision makers who must comply with shifting standards under heavy time, technological, financial and political constraints.
W74-11457

LAND DISPOSAL OF WASTE WATER: PROCESSES, DESIGN CRITERIA, AND PLANNING CONSIDERATIONS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
J. P. Hartigan, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 311, $5.50 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No ERC-1074, August 1974. 166 p, 22 fig, 8 tab, 68 ref. EPA Training Grant 900111.

Descriptors: *Waste water treatment, Overland flow, Planning, Economic efficiency, Terrain analysis, *Terrestrial habitats, Infiltration, *Waste water disposal, Filtration, Volatilization, Ion exchanges, *Water reuse.
Identifiers: *Land disposal, Spray irrigation, Rapid infiltration, Fixation, Economic goals, Social goals, Environmental goals.

The national goal of higher water quality has rejuvenated interest in developing land surfaces for use in waste water treatment. Wastes may be applied by spray irrigation, overland flow, or rapid infiltration. The land surface renovates the water through the processes of filtration, volatization, plant-uptake, ion exchange, and fixation. The application techniques vary in site requirements; sites vary in climate and topography; soils vary in process efficiency; wastes vary in the processes effective in their removal; people vary in expertise, and many disciplines can contribute to comprehensive system design. Out of all these relationships, the important parameters in the design of a land disposal system are the characteristics of the waste water, the water quality goals, possible waste water loading rates, wetting and drying schedules to maintain infiltration rates, size of the available treatment area, type of vegetative cover, and the capacity to store wastes during periods when disposal on the land surface is not advisable. This report synthesizes the above considerations into a standard planning process that can be used to select appropriate combinations of land and advanced waste treatment processes. The steps include identifying the problem in terms of expected waste loads, evaluating the terrestial ecosystem of alternative sites in terms of how the sites will respond to identified waste water characteristics, establishing economic and other environmental and social goals, formulating suitable application techniques for each site, developing alternative plans for treating the total waste load, and final screening and selection. Seventeen numerical examples are used in illustrating specific steps. (James-Geo Tech)
W74-11569

APPLICATION OF STATISTICAL TECHNIQUES TO THE SELECTION OF AN OPTIMAL POLLUTION TREATMENT PROGRAM,
Krannert Graduate School of Industrial Administration, Lafayette, Ind.
A. B. Whinston, J. R. Marsden, and D. E. Pingry.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 327, $4.75 in paper copy, $2.25 in microfiche. Indiana Water Resources Research Center, Lafayette, Technical Report No 51, June 1974. 120 p, 4 fig, 10 tab, 60 ref. OWRT-A-024-IND(8).

Descriptors: *Waste water treatment, *Regional development, *Regional analysis, *Statistical methods, Regression analysis, Data storage and retrieval, Computers, Econometrics, Statistical models, *Optimal development plans, Model studies.
Identifiers: Economic models, Production functions, Data management, Outliers.

This research is directed towards the application of statistical and related techniques to the selection of an optimal pollution treatment system. The work attempts to develop several techniques which can be used in analyzing data obtained from waste treatment plant operations. Using the concepts of cost and production functions, the possibility was explored for developing useful models for the operation of waste treatment plants. The Federal Water Control Act and the 1972 Amendments have given the states the problem of developing and monitoring regional plans for improving water quality. State pollution agencies are turning to the use of computers and modelling techniques for analyzing these problems. It is hoped that the work reported will eventually lead to techniques that help in this task.
W74-11570

LAND APPLICATION OF SEWAGE EFFLUENTS AND SLUDGES: SELECTED ABSTRACTS,
Robert S. Kerr Environmental Research Laboratory, Ada, Okla.
Copy available from GPO Sup Doc as EP1.23:660/2-74-042, $2.80; microfiche from NTIS as PB-235 386, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-042, June 1974. 248 p.

Descriptors: *Municipal wastes, *Waste water treatment, *Sludge disposal, Irrigation systems, Land reclamation, Groundwater recharge, Public health, Crop response, Cost comparisons, Soil properties, *Abstracts, *Water reuse, Sprinkler irrigation, Economic feasibility, Waste water disposal.
Identifiers: *Infiltration systems, *Overland flow systems, Pretreatment(Waste water).

Current concern about environmental conditions has focused renewed attention on land application as a waste management technique. This report combines selected abstracts from previous publications and updates the sources abstracted into the year 1973. The 568 abstracts selected for inclusion are arrayed in chronological groupings and are identified as to emphasis on effluent or sludge. An author index and a subject matter (descriptor term) index facilitate reference to specific abstracts or to abstracts addressing narrower subject matter areas. Countries, states, and, in some cases, actual project locations are included in the subject matter index as geographic locators. (Thomas-EPA)
W74-11577

WASTE WATER TREATMENT NEEDS FOR AMES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-11620

RESEARCH ON ADVANCED MEMBRANES FOR REVERSE OSMOSIS,
Envirogenics Systems Co., El Monte, Calif.
For primary bibliographic entry see Field 3A.
W74-11642

DISPOSAL OF SOLID RADIOACTIVE WASTES IN BEDDED SALT DEPOSITS.
National Academy of Sciences. National Research Council, Washington, D.C. Committee on Radioactive Waste Management.
For primary bibliographic entry see Field 5E.
W74-11657

CONTROL AND TREATMENT OF RADIOACTIVE LIQUID WASTE EFFLUENTS AT THE SAVANNAH RIVER PLANT,
Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
W. R. Jacobsen, W. L. Marter, D. A. Orth, and C. P. Ross.
Available from National Technical Information Service, Springfield, Va., 22161 as Report No DP-1349, $5.45 paper copy, $2.25 in microfiche. Report No DP-1349, February 1974. 125 p, 7 fig, 11 tab.

Descriptors: *Radioactive waste disposal, *Waste treatment, *Waste storage, *Effluents, *Monitoring, Environment, Environmental effects, Streams, Surface waters, Regulation, Seepage, Documentation, Data collections, *South Carolina.
Identifiers: *Savannah River(SC).

Radioactive waste effluents at the Savannah River Plant are treated on the basis of potential off-site effects. Those wastes that are not stored in tanks or released directly to plant streams are either discharged to seepage basins or treated further to reduce their activity before being discharged. Administrative controls require that releases not result in harmful consequences and that they are also kept as low as practical. The controls, the releases of radionuclides to seepage basins, and other methods used to treat radio active liquid wastes are described. Inventories of radioactivity in soil from discontinued practices are reported. (Houser-ORNL)
W74-11661

THE OCCURRENCE AND RETENTION OF RADIONUCLIDES IN THE SEDIMENTS OF WHITE OAK LAKE,
Oak Ridge National Laboratory, Tenn.
For primary bibliographic entry see Field 5B.
W74-11665

TRITIUM CONTROL TECHNOLOGY,
Mound Lab., Miamisburg, Ohio.
T. B. Rhinehammer, and P. H. Lamberger.
Available from NTIS, Springfield, Va 22161 as WASH-1269; $13.60 paper copy, $2.25 in microfiche. Report No WASH-1269, December 1973. 541 p, 102 fig, 24 tab, 374 ref, 1 bibliography.

Descriptors: *Tritium, *Monitoring, *Radioactivity, Effluents, *Safety, Evaluation, *Radioactive waste disposal, Waste storage, *Waste treatment, Nuclear powerplants, Nuclear reactors, Fuels, Research and development, Laboratories, Operations, Design criteria, Technology.

Current tritium control practices in the United States are summarized. The practices, methods

and operating experiences of AEC contractors and private industry in the areas of tritium monitoring, handling, containment, trapping, removal, packaging, storage, and disposal are reported. Tritium control practices of Government-owned laboratory and process facilities, light- and heavy-water reactors, fuel reprocessing plants and waste disposal facilities are described. Emphasis has been placed on current practice, design, technology and operating tritium control systems. (Houser-ORNL)
W74-11673

MERCURY RECOVERY FROM PROCESS SLUDGES,
Georgia-Pacific Corp., Bellingham, Wash.
R. A. Perry.
Chemical Engineering Progress, Vol 70, No 3, p 73-80, March, 1974. 6 fig, 11 tab, 10 ref. EPA Project 12040 DU. Program Element No 1B2037.

Descriptors: *Industrial wastes, *Mercury, *Waste water treatment, *Sludge treatment, Inorganic compounds, Solid wastes.
Identifiers: *Mercury recovery.

Mercury-cell chlor-alkali facilities in North America have reduced total mercury discharges into receiving waterways to less than 0.5 lb/day, and some to less than 0.1 lb/day. However, this has frequently involved the stockpiling of mercury-containing materials such as process sludges, and has led to a need for a new approach to mercury removal. Georgia-Pacific Corporation developed, designed, and completed a plant to demonstrate the successful recovery of mercury from these sludges and sediments. The system was sized on the basis of 3.5 ton/day to handle the expected solids at 200 ton/day chlorine production (2.0-2.5 ton/day dry solids) plus 1.0-1.5 ton/day solids from stockpiled sludge and other mercury-containing solids. The major pieces of equipment include a 6 ft x 12 ft thickener, a rotary vacuum filter and the 54 in. I.D., six-hearth multiple hearth furnace. If shower water is needed to clean the filter cloth or sluice out sludge build-ups, brine will be used and returned to the sludge pit. No fresh water will be used for wash-down to maintain water balance. This process is capable of reducing the mercury content of brine sludge to less than 1 ppm. (Jernigan-Vanderbilt)
W74-11699

CONSTRAINTS TO SPREADING SEWAGE SLUDGE ON CROPLAND,
National Environmental Research Center, Cincinnati, Ohio.
G. K. Dotson.
News of Environmental Research in Cincinnati, May 31, 1973. 4 p, 2 fig, 14 ref.

Descriptors: *Sewage sludge, *Crops, *Metals, Constraints, *Nitrogen, Agriculture, Pathogenic bacteria, Water pollution control, Nitrification, Denitrification, Toxicity, Disinfection, Soil pollution.

Constraints on the use of industrial or domestic sewage sludge for fertilizing cropland or for soil improvement in humid areas include nitrogen excesses, toxic metals, pathogens, public resistance, legal restrictions, unfavorable soils and incomplete sludge stabilization. Amounts of nitrogen supplied are estimated from the sludge application. Pathways of nitrogen conversion and the possible contamination of groundwater are discussed. Factors making toxic metals available to plants and the determination of levels which are toxic are mentioned. Pathogens in sludge can live up to several months after application to the soil. Disinfection techniques include long term storage, pasteurization, addition of lime, chlorine or other chemicals. Research needs, with regard to the nitrogen content and toxic elements, especially long-term effects, are listed. (Rowe-Vanderbilt)
W74-11701

CHARACTERIZATION AND TREATABILITY OF CHROME TANNING WASTE,
Central Public Health Engineering Research Inst., Kanpur (India).
S. N. Chattopadhaya, H. C. Arora, and V. P. Sharma.
Indian Journal of Environmental Health, Vol 15, No 3, p 208-221, July, 1973. 6 fig, 4 tab, 5 ref.

Descriptors: *Chromium, *Industrial wastes, *Waste water treatment, *Tannery wastes, Toxicity, Sampling, Suspended solids, *Flocculation, Chemical precipitation, Coagulation.
Identifiers: *India.

This study was undertaken at a tannery which utilizes chrome tanning of goats' skins, with the objective of removing chromium from waste before subjecting it to the conventional biological treatment methods. The two major sources of chromium-containing wastes were termed waste stream 'A' and waste stream 'B'. The units which contributed to stream 'A' were: (1) soaking of skins with plain water; (2) floor washings from 'Painting with sulfide and lime' unit; (3) liming unit; (4) defleshing and scudding unit; and (5) deliming and bating unit. Stream 'B' was exclusively formed by waste from a pickling and chrome tanning unit and contains a heavy quantity of exhaust chrome (mostly in trivalent form). Since the waste in channel 'A' was highly alkaline and that in channel 'B' was highly acidic, it was concluded that the obvious procedure would be to precipitate the chromium as chromium hydroxide by the simple process of neutralization. This did not work because the settled waste had fine flocs in suspension. A number of procedures on the settled waste were tested; simple flocculation followed by four hours settling showed the highest percent reduction of chromium. A stepwise procedure for treatment is given. (Jernigan-Vanderbilt)
W74-11707

WASTEWATER SAMPLING AND TESTING INSTRUMENTATION,
Georgia Inst. of Tech., Atlanta.
For primary bibliographic entry see Field 5A.
W74-11754

SOLVENT EXTRACTION OF NITRATE FROM TITANIUM LEACHER EFFLUENT,
Bureau of Mines, Salt Lake City, Utah. Salt Lake City Metallurgy Research Center.
J. R. Ross, S. R. Borrowman, and D. R. George.
Available from NTIS, Springfield, Va 22161 as PB-227 175, Price $3.00 printed copy; $2.25 microfiche. Bureau of Mines Report of Investigations 7733, 1973. 12 p, 8 fig, 1 tab.

Descriptors: *Nitrates, *Industrial wastes, *Recycling, *Waste water treatment, Water pollution control, Acids, *Titanium, *Solvent extraction, Leaching.

The extraction and recovery of nitrate from waste solutions generated in the production of titanium were investigated using solvent extraction techniques. Laboratory studies and continuous tests in a small solvent-extraction system showed that up to 98 percent of the nitrate can be selectively extracted by a solution of tributyl phosphate in kerosine. The extracted nitrate can be recovered as nitric acid, at concentrations suitable for reuse, by stripping the loaded organic with water. (Knapp-USGS)
W74-11763

CONTROL AND CONFINEMENT OF OIL POLLUTION ON WATER WITH MONOMOLECULAR SURFACE FILMS,
Naval Research Lab., Washington, D.C. Ocean Sciences Div.
For primary bibliographic entry see Field 5G.
W74-11781

EVALUATION OF A FIELD-TYPE INCINERATION FOR HUMAN WASTE, (THEATER OF OPERATION SEWAGE TREATMENT SYSTEMS),
Army Construction Engineering Research Lab., Champaign, Ill.
J. Matherly.
Available from NTIS, Springfield, Va. 22161 as AD-760 490, Price $3.00 printed copy, $2.25 microfiche. Technical Report E-10, March 1973. 58 p, 3 fig, 2 tab, 2 append. DACA 23-71-C-003.

Descriptors: *Incineration, *Burning, *Waste treatment, Ultimate disposal, Sewage disposal, Waste disposal.
Identifiers: Latrines, Human wastes.

An Army burn-out latrine was modified to improve its operational characteristics while maintaining simplicity of fabrication. Modifications to the original design consist of a method of metering fuel into a waste container and the addition of a burner stack assembly designed to reduce smoke by improving air-fuel mixture and detention time. These modifications were fabricated, operated, and tested under field conditions. The modified method of incinerating human excreta under field conditions has a substantial number of major limitations and drawbacks in the areas of fuel consumption, manpower requirements, and esthetic and hygiene considerations. The only clear-cut advantage to use of the modified burn-out latrine was production of less smoke. It was therefore concluded that development of this modifcation to the burn-out latrine produced no great advance toward solution of the problem of human excreta treatment and disposal under field conditions. The system is recommended only for situations requiring a temporary solution for a minimal number of individuals. Further effort should be devoted to alternative methods of human waste treatment and disposal. (Knapp-USGS)
W74-11785

WATER AND WASTE MANAGEMENT IN POULTRY PROCESSING,
North Carolina State Univ., Raleigh.
R. E. Carawan, W. M. Crosswhite, J. A. Macon, and B. K. Hawkins.
Copy available from GPO Sup Doc as EP1.23:660/2-74-031, $2.50; microfiche from NTIS, Springfield, Va 22161 as PB-235 559, $2.25. Environmental Protection Agency Technology Series Report EPA-660/2-74-031, May 1974. 223 p, 48 fig, 55 tab, 24 ref, 3 append. EPA Project 12060 EGV.

Descriptors: *Industrial water, *Industrial wastes, *Food processing industry, Poultry, *Water reuse, *Waste water treatment, Operating costs, Waste treatment.
Identifiers: *Poultry processing industry, In-plant water management, In-plant waste control.

A typical broiler processing plant was used to evaluate changes in equipment and processing techniques to reduce water use and waste load. Production at the plant was through two processing lines and totaled approximately 70,000 broilers per day. Benchmark results indicated a water use of 12.28 gallons per bird received which was reduced by 32 percent to 7.81 gallons per bird which was reduced by 66 percent to 1355 lbs BOD5. Changes made are detailed and economic analysis showed all to be profitable for the plant with an average annual net savings of $4.08 per 1000 broilers processed. An initial investment of $93,065 was needed. Annual operating costs were $31,023 with annual net savings of $72,193. A water and waste management program is detailed. Microbiological analyses indicated no deterioration in product quality as a result of the changes. (EPA)
W74-11789

GRANITE INDUSTRY WASTEWATER TREATMENT,
Vermont Dept. of Water Resources, Montpelier. Agency of Environmental Conservation.
W. B. Farnham.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-040, $1.45; microfiche from NTIS as PB-235 505 $2.25. Environmental Protection Agency Technology Series Report EPA-660/2-74-040, May 1974. 160 p, 8 fig, 45 tab, 5 ref. EPA Project 12080 GCH.

Descriptors: Water pollution, *Pollution abatement, Granites, Water pollution sources, Water pollution control, Water conservation, Waste water disposal, *Sludge disposal, Water reuse, *Vermont, *Waste water treatment, Separation techniques, Pilot plants, Byproducts, Lagoons, Settling basins.
Identifiers: Granite industry, Chemical treatment, *Granite processing wastes.

A study of wastewater discharge in the granite industry has been conducted to determine wastewater characteristics, methods of pollution abatement and disposal methods for waste granite sludge. The project included a study of overall water use in a granite plant, water optimization studies, and water reduction studies. Laboratory testing was conduced for waste characterization and liquid solids separation techniques. A pilot plant was designed, constructed and operated to test the efficiency of plant scale separation procedures. A prototype plant was designed and constructed to test the possibility of complete water reuse in the granite industry. Successful operation of both plants indicates that a practical method of treating granite waste effluent has been developed and that complete recycle of treated effluent is possible and economically feasible. Studies were performed to determine the possibility of by-product use of waste granite sludge. Two uses were found for the sludge, but an economic evaluation indicated that there was insufficient raw material to establish a by-product industry. A survey of sludge disposal methods in the industry showed that some modification of waste disposal facilities, and more cooperation by the industry, would improve the sludge disposal procedures. A modified type of settling lagoon was recommended. (EPA)
W74-11790

STATE-OF-THE-ART: URANIUM MINING, MILLING, AND REFINING INDUSTRY.
Robert S. Kerr Environmental Lab., Ada, Okla.
D. A. Clark.
Copy available from GPO Sup Doc as EP1.23:660/2-74-038, $1.55; microfiche from NTIS, Springfield, Va 22161 as PB-235 557, $2.25. Environmental Protection Agency Technology Series report EPA-660/2-74-038, June 1974. 113 p, 11 fig, 3 tab, 74 ref. EPA Project 21AGF-02. Program Element 1BB040.

Descriptors: *Waste water treatment, *Waste disposal, *Mine water, Seepage, Stabilization, Research and development, Surface water, Groundwater, Water pollution sources, Environmental effects, Industrial plants, Chemical wastes, Radioactive wastes, Solid wastes, Chemical precipitation, Neutralization, Water quality standards, Monitoring, *Reviews.
Identifiers: *Mining wastes, Leachability of solids, Physical upgrading, Suspended solids, *Uranium mining.

An overview is presented of the uranium mining, milling, and refining industry of the United States. Topics discussed include ore reserves, geographical locations, production statistics, future requirements, processes for extraction and beneficiating, waste characteristics, including radioactive and other potential pollutants, current treatment and disposal methods, effects of wastes on the environment, standards for radiological protection, testing and monitoring programs, technological advances within the uranium industry, anticipated future problems, and recommended areas for further study. (EPA)
W74-11791

A WASTE TREATMENT SYSTEM FOR CONFINED HOG RAISING OPERATIONS,
Midwest Research Inst., Kansas City, Mo.
W. E. Park.
Copy available from GPO Sup Doc as EP1.23:660/2-74-047, $1.20; microfiche from NTIS, Springfield, Va 22161 as PB-235 558, $2.25. Environmental Protection Agency Technology Series Report, EPA-660/2-74-047, May 1974. 73 p, 2 fig, 9 tab. EPA Project 13040 EVM.

Descriptors: *Hogs, *Waste water treatment, *Aeration, *Settling basins, *Aerobic digestion, *Farm wastes, *Missouri, *Oxidation lagoons, Waste treatment, Capital costs, Operating costs, Waste disposal.
Identifiers: Odor control, Surface aerators, Flushing gutters.

A waste treatment system was installed in conjunction with an existing confined swine feeding operation at Schuster Farms, Gower, Missouri. The system consisted of a concrete aeration tank equipped with mechanical surface aerators, followed by a settling pond. Wastes from the 1,000-hog feeding operation were flushed through a gutter in the concrete feeding floor into the aeration tank, where they were aerobically digested. All aeration tank discharges were retained in the settling pond where the liquids evaporated. The waste treatment facility operated continuously and dependably over a 2-year period, with treatment efficiency averaging 90% to 95%. The system effectively controlled objectionable odors and insects, contained all liquid runoff emanating from the feeding operation, and left only a dry, inert residue suitable for land disposal. Installation cost for the system was $12,000. Net operating costs, including amortization of capital costs, were $7.33 per day. Thus, total environmental control was achieved at a cost of approximately $1.00 per hog, or 1/2 cent per pound (1.1 cent per kilogram) of weight gained while on the feeding floor. (EPA)
W74-11792

COLOR CHARACTERIZATION BEFORE AND AFTER LIME TREATMENT,
Institute of Paper Chemistry, Appleton, Wis.
H. S. Dugal, R. M. Leekley, and J. W. Swanson.
Copy available from GPO Sup Doc as EP1.23:660/2-74-029, $2.15; microfiche from NTIS, Springfield, Va 22161 as PB-235 493, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-029, April 1974. 174 p, 62 fig, 42 tab, 21 ref, 5 append. EPA Project S 800853.

Descriptors: Effluents, *Waste water treatment, Chemical analysis, Water pollution, Tertiary treatment, Lime, Sewage treatment, *Industrial wastes, *Color reactions.
Identifiers: *Lime treatment, Massive lime treatment, Stoichiometric lime treatment, Kraft color, Neutral sulfite semichemical color, Kraft decker effluent, Kraft bleach effluent, Kraft caustic extract, *Color characterization, *Color isolation.

In general, lime treatment removed maximum color from the caustic extract and minimum from the neutral sulfite semichemical (NSSC) effluent. The massive lime treatment was found to remove 73 percent color and 53 percent total organic carbon (TOC) from kraft decker effluent, and 96 percent color and 80 percent TOC from kraft bleach caustic extract. The analysis of the solids from the decker and caustic effluents showed respective reductions of 73 and 59 percent phenolic hydroxyls, 63 and 26 percent sugars, and 51 and 16 percent methoxyls by lime treatment. The stoichiometric lime treatment was found to remove 79 percent color and 50 percent TOC from kraft decker effluent, and 64 percent color and 30 percent TOC from NSSC effluent. The analysis of the solids from the decker and NSSC effluents showed respective reductions of 76 and 25 percent phenolic hydroxyls, 31 and 'negligible' percent sugars, and 42 and 9.7 percent methoxyls by lime treatment. In the metal ion-lime system the addition of 150-300 ppm FeCl3 with only 300-500 ppm lime removed about 98 percent color from bleach caustic extract. Over 50 percent of the color left by conventional lime treatment process could also be removed by incorporating polyvalent metal ions with lime. However, below 1000 ppm of lime, the sludge obtained settled slowly. More color could be removed by metal ion-lime system than when each was used individually indicating that a 'synergistic' effect exists. (EPA)
W74-11793

ANALYSIS OF COPROSTANOL, AN INDICATOR OF FECAL CONTAMINATION,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5A.
W74-11794

PROTEIN PRODUCTION FROM ACID WHEY VIA FERMENTATION,
Milbrew, Inc., Juneau, Wis. Amber Lab. Div.
S. Bernstein, and T. C. Everson.
Copy available from GPO Sup Doc as EP1.23:660/2-74-025, $1.25; microfiche from NTIS, Springfield, Va 22161 as PB-235 504, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-025, May 1974. 80 p, 9 fig, 9 tab, 12 ref, append. EPA Program Element 1BB037. Grant No. S-800747.

Descriptors: *Industrial wastes, *Fermentation, *Dairy industry, *Byproducts, *Proteins, Pilot plants, Yeasts, *Waste treatment, Waste water treatment.
Identifiers: *Dairy wastes, Continuous fermentation, Animal feeds, Cheese whey.

From the operation of a demonstration pilot plant over extended periods of time, it has been shown that yeast may be grown on an acid whey or sweet whey medium in a continuous, deep tank aerated fermentor. Variations in fermentation conditions, strain selection, and medium composition produced cell concentrations of several billion cells per milliliter. By a process of evaporation and spray drying the whole fermented whey mass and the utilization of the evaporator condensate to dilute incoming condensed whey, a high grade, non-toxic, protein feed material may be produced without any effluent streams. Amino acid analyses and protein efficiency ratios are presented for this feed material. Economic estimates show that while a large capital investment and low cost raw material are required for the commercial feasibility of this fermentation process, it will be competitive with other methods for the manufacture of single cell protein. This whey fermentation is one means of converting large quantities of a potential environmental pollutant into a useful and needed product. (EPA)
W74-11795

TREATMENT OF PACKINGHOUSE WASTES BY ANAEROBIC LAGOONS AND PLASTIC-MEDIA FILTERS,
Farmland Foods, Inc., Denison, Iowa.
D. A. Baker, A. H. Wymore, and J. E. White.
Copy available from GPO Sup Doc as EP1.23:660/2-74-027, $1.20; microfiche from NTIS, Springfield, Va 22161 as PB-235 566, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-027, April 1974. 76 p, 10 fig, 38 tab, 8 ref, append. EPA Project 12060 DFF, Program Element 1BB037.

Descriptors: *Industrial wastes, *Waste treatment, *Trickling filters, *Waste water treatment,

Plastics, Anaerobic digestion, Flotation, Chlorination, Biochemical oxygen demand.
Identifiers: *Packinghouse wastes, *Anaerobic lagoons, Plastic media.

Studies were conducted to demonstrate the efficiency and suitability of using dissolved air flotation, anaerobic lagoons, plastic media trickling filters and chlorination as a system for treating 1 mgd of waste water from a meat packing plant. The primary objective was to determine if the plastic media filters could be used to replace the aerobic lagoon system normally used to treat the anaerobic lagoon effluent. The overall reduction of 5-day Biochemical Oxygen Demand (BOD5) through the system averaged 98.5% over the ten month evaluation period leaving a discharge concentration of 61 mg/l. Suspended solids were reduced 95.4% through the entire system, leaving an effluent concentration of 90 mg/l after chlorination. The BOD5 reduction in the anaerobic lagoons averaged 82% and accounted for the majority of BOD5 removed in the system. The BOD5 reduction through the plastic media trickling filters averaged 74% of the applied loading which was below the 91% efficiency expected during design. Hydraulic overload, organic overload, and possibly grease concentrations, contributed to the lower-than-expected performance. The cost of the treatment system was calculated to be $0.079 per hog killed or $0.344 per 1000 lb live weight killed. (EPA)
W74-11797

ACTIVATED SLUDGE PROCESS USING PURE OXYGEN,
Union Carbide Corp., Tonawanda, N.Y. Linde Div.
E. A. Wilcox, and S. O. Akinbami.
Copy available from GPO Sup Doc as EP1.23:670/2-73-042, $0.95; microfiche from NTIS, Springfield, Va 22161 as PB-235 572, $2.25. Environmental Protection Agency, Technology Series Report EPA-670/2-73-042, February 1974. 48 p. EPA Project 11010 FRN; 14-12-846, Program Element 1B2033.

Descriptors: *Oxygen requirements, *Activated sludge, Microorganism, Sedimentation rates, *Dissolved oxygen, Biochemical oxygen demand, *Waste water treatment, *Oxygenation.
Identifiers: *Oxygen activated sludge, Plug flow reactor, Mixed liquor, Alum addition, Phosphorus removal, Endogenous respiration, Sludge production.

The oxygen activated sludge system (UNOX) consisted of a unique, four stage, gas tight biological reactor that employed co-current gas-liquid contacting. In less than 1.85 hours of oxygenation, the system removed 90 percent of the influent BOD5 and utilized over 95 percent of the supplied oxygen. The microbial organisms visually were essentially the same as those found in a typical conventional system. Their rate of activity, however, was greater than those of the air system. Satisfactory solid-liquid separation was achieved at clarifier overflow rates varying between 300 and 1940 gallons per day per square foot. The clarifier underflow concentrations varied from 1.0 to 2.4 percent and mixed liquor suspended solids were maintained between 4000 and 7600 mg/l. Solids production averaged between 0.2 and 0.5 lb solids wasted per lb BOD removed. (Bishop-EPA)
W74-11799

A TEST METHOD FOR VOLATILE COMPONENT STRIPPING OF WASTE WATER,
Arkansas Univ., Fayetteville. Coll. of Engineering.
L. J. Thibodeaux.
Copy available from GPO Sup Doc as EP1.23:660/2-74-044, $1.70; microfiche from NTIS, Springfield, Va 22161 as PB-235 567, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-044, May 1974. 130 p, 27 fig, 9 tab, 21 ref, 3 append. EPA Project R-801876.

Descriptors: *Waste water treatment, *Cooling towers, *Testing procedures, *Volatility, *Industrial wastes, Air pollution, Mass transfer, Biochemical oxygen demand, Chemical oxygen demand, Gas chromatography, Laboratory tests, Self-purification, Safety.
Identifiers: *Air stripping, *Desorption, Relative volatilization rate, Total organic carbon, Intalox saddle, Volatile organics, Acetone, Propanol, Methanol, Butanol, Furfural, Phenol.

The primary purpose was to develop laboratory apparatus and procedures that may be employed to assess the desirability of air-stripping in cooling towers as a treatment operation for removal of a portion of the organics from industrial waste water. The apparatus developed consists of a short packed (Intalox Saddle) section with liquid recirculation and single pass countercurrent air flow. Desorption is performed in the apparatus at 25C and ambient pressure conditions. Desorption experiments were performed on single pure components in water, simulated waste water preparations and actual industrial waste water samples. Industrial waste water samples were representative of: poultry, metal, oil-field, canning, pharmaceutical, paper, food, fibers, petroleum refinery and petrochemical industries. BOD, COD, TOC and gas chromatographic analysis were employed. Industrial waste waters were found to contain a non-volatile organic fraction that remains in the aqueous phase and a volatile organic fraction that can be transferred to the air phase. Results of one hour desportion runs indicate that the range of the volatile organic fraction is 0% to 70% TOC. The ultimate volatile range was calculated to be 0% to 98% TOC. The volatile organic fractions displayed a range of relative volatilization rates 4.4 to 41.6 times greater than water. The net result of the desorption experiments is that some industrial waste waters can be effectively treated by air-stripping a sizeable portion of the dissolved organics. (EPA)
W74-11801

COLOR REMOVAL AND SLUDGE DISPOSAL PROCESS FOR KRAFT MILL EFFLUENTS,
Continental Can Co., Inc., Hodge, La. Mill Operations Div.
E. L. Spruill, Jr.
Copy available from GPO Sup Doc as EP1.23:660/2-74-008, $1.65; microfiche from NTIS, Springfield, Va 22161 as PB-235 573, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-008, February 1974. 124 p, 21 fig, 20 tab, 22 ref, 4 append. EPA Project 12040 DRY.

Descriptors: *Pulp and paper industry, *Waste water treatment, *Chemical precipitation, Lime, Color, *Sludge disposal, Physical properties, Centrifugation, Dewatering, Incineration, Ultimate disposal, Costs.
Identifiers: *Lime treatment, *Color removal, Kraft effluent, Kraft sludge disposal.

A treatment plant, removing color by lime addition and recovering sludges, has been treating over 80% of the effluent of an unbleached kraft mill for one year. Using up to 1,100 mg/l of CaO, with normal mill fiber loss as a precipitation aid, average color reduction was 80% for all-kraft effluent. At upper range of lime dosage, when residual dissolved Ca was above 400 mg/l as CaO, color removal was 85-93%. When mill production included 33-40% NSSC hardwood pulp, color reduction averaged only 65%. About 12% BOD5 reduction was observed, and average TOC reduction was nearly 40%. The chief negative factor is need for emergency protection against alkaline impact on secondary treatment and receiving stream. Following centrifuge dewatering, sludge incineration has had minimal impact on kiln operation; there were some adverse effects on lime quality. Lime recovery was 93%. Mill kiln capacity must be increased about 25%. Primary clarification and sludge disposal are included in the process. Operating costs, exclusive of capital factors, are estimated at $0.50-$0.80 per ton of paper, or 5.5 cents to 6.5 cents per thousand gallons, depending on fiber losses and water usage. (EPA)
W74-11803

ANAEROBIC-AEROBIC LAGOON TREATMENT OF DAIRY MANURE WASTES,
Washington State Univ., Pullman. Engineering Research Div.
D. E. Proctor.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 574, $6.00 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Report EPA 660/2-74-030, May 1974. 47 p, 10 fig, 7 tab, 6 ref. Grant No WPD 184-01-67. EPA Project 13040 DFN.

Descriptors: *Waste water treatment, *Activated sludge, *Aerobic treatment, *Anaerobic digestion, *Farm lagoons, Foam separation, Harvesting of algae, Dairy industry, Farm wastes, *Nutrient removal, Pacific Northwest U.S.
Identifiers: Dairy manure, Anaerobic lagoons.

The removal of manure from diary cattle confinement areas by improved hydraulic flushing techniques was attempted in conjunction with an attempt to treat the resulting manure slurry in an anaerobic lagoon and activated sludge process. Algae cells were allowed to propagate in the activated sludge process effluent in an attempt to then harvest the cells and accomplish nutrient removal as a final polishing step. While manure could be hydraulically moved by high velocity flushing jets, it resulted in a slurry that was too thick to flow by gravity to catch basins within the cattle confinement areas. The anaerobic lagoon-activated sludge process sequence did accomplish overall pollutional strength reductions as high as 90%. The activated sludge process effluent was still too high in organic strength, color, and nutrients to be discharged to surface waters, however. Dissolved air flotation of algae cells produced in shallow propagation ponds was ineffective. (Boydston-EPA)
W74-11804

SUMMARY OF DESALINATION PLANT BRINE DISPOSAL METHODS FOR INLAND LOCATIONS, FINAL REPORT, FEBRUARY 1971.
Fluor Corp. Ltd., Los Angeles, Calif.
For primary bibliographic entry see Field 3A.
W74-11808

PROCEEDINGS OF CONFERENCE ON LAND DISPOSAL OF MUNICIPAL EFFLUENTS AND SLUDGES,
Environmental Protection Agency, New York.
R. W. Mason, and C. E. Hess.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 115, $16.50 in paper copy, $2.25 in microfiche. Conference Held March 12-13, 1973, at Rutgers, The State University of New Jersey, 1973. 261 p.

Descriptors: *Conferences, *Municipal wastes, Effluents, Land treatment, Environmental effects, Public health, Sludge disposal, Sewage sludge, Waste water treatment, Municipal sludge, *Waste disposal, *Water reuse.
Identifiers: *Land disposal, Treatment methods.

The proceedings of a conference sponsored by the United States Environmental Protection Agency and the College of Agriculture and Environmental Science of Rutgers University includes 19 articles. These deal with both sludge disposal on land and with the land treatment of municipal effluents. The mechanics and problems of land disposal as applied to specific municipalities, as well as environmental and social effects are discussed. (See also W74-11834 thru W74-11852) (Prague-FIRL)
W74-11833

SLUDGE CHARACTERISTICS OF MUNICIPAL SOLIDS,
Rutgers - The State Univ., New Brunswick, N.J. Coll. of Agriculture and Environmental Science.
A. J. Kaplovsky, and E. Genetelli.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 3-18, 1973. 6 tab.

Descriptors: *Sludge, *Sludge disposal, Landfills, Municipal wastes, Economics, Farm management, Feasibility.
Identifiers: *Sludge characteristics.

The practice of land disposal is analyzed historically emphasizing that the degree of sophistication is dependent upon the local, social, and economic conditions as well as the sludge characteristics. The formation of sludge from municipal wastes and solids handling are reviewed, with the composition of the sludge being calculated. In light of existing constituent composition found in waste sludges, the inherent concentration variability and the many factors which must be considered for crop management, the true feasibility and economics of land disposal are largely unanswered. More specifically, the practices of ultimate disposal, management, and economic and social implications are directly or indirectly related to the composition and character of the material requiring disposal. (See also W74-11833) (Sandoski-FIRL)
W74-11834

DISPOSAL AND REUSE OF SLUDGE AND SEWAGE: WHAT ARE THE OPTIONS,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
R. B. Dean.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 19-30, 1973. 1 fig, 1 tab, 8 ref.

Descriptors: *Sludge disposal, Landfills, Water reclamation, Organic matter, Minerals, Nitrogen, Phosphorus, Potassium, Zinc, Lime, Heavy metals, Salts.
Identifiers: *Sludge characteristics.

Some of the properties and quantities of municipal waste solids are reviewed briefly. Sludge when applied to the land is discussed in general with regard to water, organic matter, and inert minerals, and specifically with regard to nitrogen, phosphorus, potassium, zinc, lime, heavy metals, and salts. (See also W74-11833) (Sandoski-FIRL)
W74-11835

SOILS AS SLUDGE ASSIMILATORS,
Forest Service (USDA), Washington, D.C. Div. of Forest Environment Research.
J. O. Evans.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 31-52, 1973. 1 tab, 10 ref.

Descriptors: *Soil chemical properties, *Soil physical properties, *Sludge, Soil disposal fields, Soil microorganisms, Soil management, Soil investigations, Soils.

Factors which determine the relative ability of soils to act as sludge assimilators are presented. Soil properties that facilitate sludge assimilation such as ion exchange capacity and buffer capacities, soil filterability and microbial transformations, and various application techniques are discussed. Physical factors relating to sludge assimilation (sldge characteristics, physical soil characteristics, climatic, biotic, and land influences, and loading rates), and the sludge chemical analysis and soil chemistry, and micro- and macro-organisms are discussed. (See also W74-11833) (Sandoski-FIRL)
W74-11836

MODES OF TRANSPORTING AND APPLYING SLUDGE,
Bauer Engineering, Inc., Chicago, Ill.
W. J. Bauer.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 53-66, 1973. 1 fig, 2 tab.

Descriptors: *Sludge disposal, *Application methods, Transportation, Dewatering, Pipelines, Barges, Roads, Railroads, Economics, Comparative costs, Comparative benefits.

Alternative methods for dewatering, transporting, and applying sludges resulting from treatment of municipal sewage are discussed. Sludge characteristics, costs of dewatering, and hydraulic characteristics are generalized. Pipeline, truck, barge, and rail transportation systems are discussed. Five application methods are presented with the preferred being the plowing in of a slurry fed continuously through a hose to a moving plow. Illustrated are various combinations of systems and their economic significance is described. (See also W74-11833) (Sandoski-FIRL)
W74-11837

SOME CONSTRAINTS OF SPREADING SLUDGE ON CROPLAND,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
G. K. Dotson.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 67-79, 1973. 15 ref.

Descriptors: *Sludge disposal, *Farm management, *Nitrogen, *Toxicity, Heavy metals, Trace elements, Pathogenic bacteria, Sewage sludge, Application methods.

The composition of sewage sludge is discussed emphasizing nitrogen, metals, and pathogens. The various aspects of soil nitrogen include mineralization, digestion, denitrification, plant uptake, and runoff removal. The fate of heavy metals, trace elements toxicity, and the permissive levels of trace elements also are reviewed. Methods of pathogenic destruction are mentioned as well as the application of sewage sludge to soil for crop production and/or soil improvement. (See also W74-11833) (Sandoski-FIRL)
W74-11838

METHODS OF LIQUID FERTILIZER APPLICATION,
Metropolitan Sanitary District of Greater Chicago, Ill.
B. T. Lynam, and R. O. Carlson.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 81-90a, 1973. 3 fig, 1 ref.

Descriptors: *Sewage sludge, *Sludge disposal, Organic matter, Crop production, Nutrients, Irrigations systems, Fertilizers, Flood irrigation, Transportation, Application methods, *Illinois, Water reuse.
Identifiers: *Chicago(ILL), Manifolds.

The Metropolitan Sanitary District of Greater Chicago, Illinois applies anaerobically digested sewage sludge to strip mine land to restore its organic matter content and to supply plant nutrients for crop production. The methods of application include: a tank truck equipped with a manifold across the rear end; various irrigation systems; and an incorporation method that is being developed. Each of the systems is described briefly. (See also W74-11833) (Sandoski-FIRL)
W74-11839

EQUIPMENT FOR INCORPORATING SEWAGE SLUDGE AND ANIMAL MANURES INTO THE SOIL,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Biological and Agricultural Engineering.
C. H. Reed.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 91-100a, 1973. 6 ref.

Descriptors: *Equipment, *Sewage sludge, *Sludge disposal, *Farm wastes, Soil disposal fields, Application equipment.
Identifiers: *Land application.

The incorporation of wastes directly into the soil is superior to surface spreading because there is no odor, no opportunity for flies or other pests to feed or breed, and no runoff or surface erosion of wastes. Also, the wastes are placed in the best possible media for immediate degradation to plant nutrients and utilization by plants. The design of an effective land treatment system and the selection of appropriate equipment necessitates the consideration of many factors, some of which are outlined. Presented are equipment and devices used for such application techniques as the ridge-and-furrow method, sub-sod-injection, and plow-furrow-cover. (See also W74-11833) (Sandoski-FIRL)
W74-11840

SLUDGE DISPOSAL STUDIES AT BELTSVILLE,
Agricultural Research Service, Beltsville, Md. Biological Waste Management Lab.
J. M. Walker.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 101-116, 1973. 2 fig, 3 tab.

Descriptors: *Onsite tests, *Laboratory tests, *Sewage sludge, *Sludge disposal, *Soil management, Crop production, Toxicity, Pathogenic bacteria, Nitrogen, Zinc, Nickel, Cadmium, Copper, Soil disposal fields, *Maryland.
Identifiers: *Beltsville(MD).

Results of four field studies and a number of laboratory studies on the use of dewatered sewage sludge for soil improvement are highlighted. The primary concern has been with what limits the amount of sludge can be safely applied to soils. These limitations were grouped into categories: short-term limitations including the initial toxicity of sludges to plants, pathogen presence and survival, and excessive quantities of nitrogen; and, toxicity from heavy metals such as zinc, cadmium, copper, and nickel. The research goal has been to use sewage sludge to improve soils at a reasonable cost, with minimum hazard to health, and with minimum soil and water pollution. (See also W74-11833) (Sandoski-FIRL)
W74-11841

MERCHANDISING HEAT-DRIED SLUDGE,
Milwaukee Sewerage Commission, Wis.
C. G. Wilson.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 117-123, 1973.

Descriptors: *Sludge disposal, *Activated sludge, *Byproducts, Crops, Fertilizers.
Identifiers: *Sludge merchandising, Milwaukee(WI), Milorganite.

Employing the activated method of municipal sewage disposal since 1920, the city of Milwaukee, Wisconsin has used heat-dried sludge, named Milorganite, to help offset costs. In merchandizing such sludge, the following points have been found important: knowledge of what the byproduct can and cannot do in growing plants; national market to balance seasonal and climatic variables; sales based on agronomic service; and, a strong distribution system. (See also W74-11833) (Sandoski-FIRL)
W74-11842

OCEAN COUNTY SEWERAGE AUTHORITY WASTE WATER SOLIDS UTILIZATION ON LAND DEMONSTRATION PROJECT,
Ocean County Sewerage Authority, N.J.
M. Gritzuk.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 125-132, 1973. 2 fig.

Descriptors: *Pilot plants, *Sludge disposal, Application methods, Sites, Monitoring, Comparative costs, Evaluation, Soil disposal fields, Sewage sludge, *New Jersey.
Identifiers: *Ocean County(NJ).

Ocean County, New Jersey will soon start construction of a sewerage system that will produce about 25,000 dry tons of sludge annually. A demonstration project has been initiated to determine if sludge reuse is possible, economically feasible, and environmentally desirable for the County. The following project aspects are outlined: sludge characteristics for reuse; goals; activities such as site selection, application methods, hydrologic and geologic characteristics, soil conditions and vegetation, atmospheric and meteorological monitoring, loading rates, aesthetic evaluation; and cost comparisons. (See also W74-11833) (Sandoski-FIRL)
W74-11843

EPA VIEWPOINT ON LAND APPLICATION OF LIQUID EFFLUENTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
J. R. Trax.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 133-142, 1973.

Descriptors: *Municipal wastes, *Land management, *Federal project policy, Irrigation systems, Crop production, Infiltration, Overland flow, Application methods, *Waste disposal, Liquid wastes, *Water reuse.
Identifiers: Opinions, Land application.

Land treatment can be divided into the following categories: infiltration-percolation, cropland irrigation, spray-runoff, and solids benefaction. Approximately 14 percent of the total budget for fiscal 1974 for the EPA Municipal Technology Research Program, or about $1.2 million, is planned for development of land treatment technology which includes sludge application to the land. The philosophy behind the Program is outlined. (See also W74-11833) (Sandoski-FIRL)
W74-11844

LAND TREATMENT AND ENVIRONMENTAL ALTERNATIVES,
Natural Resources Defense Council, Washington, D.C. Project on Clean Water.
B. Reid.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 143-150, 1973.

Descriptors: *Water pollution control, *Land management, *Waste water treatment, Waste disposal, Performance, Costs, Public health, Political aspects.

Statistics and examples of problems of water pollution and its control are presented, emphasizing the need for zero discharge of pollutants and proposing land disposal as a viable, natural alternative. Land treatment is defined as a complex system which must be carefully planned and engineered to assure that the rate of application of treated waste water conforms to local climate so as not to overload the desired treatment levels. Questions are raised on the following four considerations of land treatment: performance; costs, in terms of capital, operations, outlays, and returns or profits; political acceptance; and, public health. (See also W74-11833) (Sandoski-FIRL)
W74-11845

NEW YORK STATE'S VIEW OF LAND DISPOSAL,
New York State Dept. of Environmental Conservation, Albany. Bureau of Municipal Wastes.
F. O. Bogedain.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 151-164, 1973. 2 tab, 7 ref.

Descriptors: *Land management, *Waste disposal, Waste water treatment, *New York, Sewerage, Research and development, Municipal wastes, Industrial wastes,
Identifiers: *Land disposal.

A history of the initiation and implementation of the land disposal method for waste water is described briefly. Municipal, industrial, and individual system statistics are mentioned. The following conclusions are drawn as regarding the State of New York and its position on land disposal. Land disposal is an established method of waste disposal, but is little used. Numerous problems can be encountered with this approach even when competent planning, design, construction, and operation stages are not omitted. More detailed studies of the increasingly larger installations are needed to assist in decisions involving the use of land disposal. (See also W74-11833) (Sandoski-FIRL)
W74-11846

MUNICIPAL EFFLUENT CHARACTERISTICS,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 5B.
W74-11847

FATE OF MATERIALS APPLIED,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5B.
W74-11848

PROTECTION OF THE PUBLIC HEALTH,
Army Medical Environmental Engineering Research Unit, Aberdeen Proving Ground, Md.
C. A. Sorber.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 201-209, 1973. 4 ref.

Descriptors: *Public health, *Waste water treatment, *Land management, Waste disposal, *Waste water disposal, Pretreatment(Water), Water pollution control.

The public health aspects of waste water treatment by land disposal are dependent upon a number of variables, the most important of which is the ultimate use of the waste water. Another area of importance is the degree of pre-treatment for the waste water prior to land disposal. The effects of these prime variables are grouped into the areas of physical, biological, and chemical considerations. Few public health problems would exist as a result of spray irrigation or land disposal of waste water if basic steps such as site selection and planning with regard to aforementioned considerations were taken into account when designing and implementing a land disposal field. (See also W74-11833) (Sandoski-FIRL)
W74-11849

EXPERIENCES WITH LAND SPREADING OF MUNICIPAL EFFLUENTS,
Robert S. Kerr Water Research Center. Ada, Okla.
R. E. Thomas, and C. C. Harlin, Jr.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 211-225, 1973. 1 tab, 8 ref.

Descriptors: *Land management, *Municipal wastes, *Waste disposal, Waste water treatment, Waste water disposal, *Water reuse, *Irrigation systems, Soil-water-plant relationships, Research and development, Federal project policy, *Overland flow.
Identifiers: *Infiltration-percolation.

The Environmental Protection Agency's involvement in land spreading of municipal effluents for treatment and/or reuse is summarized. Three areas of interest include infiltration-percolation, cropland irrigation, and spray-runoff which have well-defined differences regarding land area requirements and the resulting interactions with the plant, soil, and water components of localized ecosystems. (See also W74-11833) (Sandoski-FIRL)
W74-11850

NATIONWIDE EXPERIENCES IN LAND TREATMENT,
Metcalf and Eddy, Inc., Palo Alto, Calif.
C. E. Pound, and R. W. Crites.
In: Proceedings of Conference on Land Disposal of Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 227-244, 1973. 1 fig, 6 tab, 21 ref.

Descriptors: *Waste water disposal, *Waste water treatment, *Overland flow, Investigations, *Design, Environmental effects, Costs, Administration, Public health, Safety, Sites, *Irrigation.
Identifiers: *Infiltration-percolation, Site characteristics, Waste water characteristics.

The three basic modes of land application of waste water are crop irrigation, overland flow or spray-runoff, and infiltration-percolation. The methods are presently being studied to determine the following objectives: key parameters for design, effects on the environment, health and safety risks, costs, and additional study areas. Site and waste water characteristics are reviewed and general statistics are given for the three modes. A detailed description including design, management, costs, and health aspects, is included only for the crop irrigation systems. (See also W74-11833) (Sandoski-FIRL)
W74-11851

A SURVEY OF LAND APPLICATION OF WASTE WATER FACILITIES,
American Public Works Association, Chicago, Ill.
R. H. Sullivan.
In: Proceedings of Conference on Land Disposal and Municipal Effluents and Sludges, March 12-13, 1973, Rutgers University, New Brunswick, New Jersey, p 245-261, 1973.

Descriptors: *Surveys, *Waste disposal fields, *Municipal wastes, *Industrial wastes, Land management, Application methods, Soil types, In-

stallations, Irrigation systems, *Treatment facilities, *Water reuse.

A field survey of 100 facilities where land application of domestic and industrial waste water effluents was utilized gave the following results: communities generally use their land application system on a continuous basis; ground cover utilized for municipal systems is divided between grass and crops; land application systems are generally used on a daily basis; and application rates for crop irrigation are very low in terms of inches of water per week. Many types of soils were used, with sand, loam, and silt the most common. Most operating agencies are planning to expand or continue their installations; industries surveyed treat their total waste flow by land application; secondary treatment is generally provided by municipalities prior to land application; spray irrigation is the most frequently used method of application. Land use zoning for land application sites is predominantly classified as farming. Waste water generally is transported to the application site by pressure lines; many community land application facilities have been in use for several years, more than half for over 15 years. Renovated waste water is seldom collected by underdrains. Land application facilities do not make efforts to preclude public access and water, soil uptake, and crop uptake monitoring is not carried out with any consistency. (See also W74-11833) (Sandoski-FIRL)
W74-11852

NUTRIENT LOADING FROM A SEPARATE STORM SEWER IN MADISON, WISCONSIN,
Bechtel Corp., San Francisco, Calif.
For primary bibliographic entry see Field 5B.
W74-11853

RAIN RETENTION BASINS AND RAINWATER DISCHARGES (REGENBECKEN UND REGENENTLASTUNGEN),
W. Munz.
Gas - Wasser - Abwasser, Vol 54, No 3, p 98-110, April, 1974. 40 fig, 13 tab, 2 ref.

Descriptors: *Rainwater, *Settling basins, *Sewer systems, Flow rates, Canal design, Costs, Design criteria.
Identifiers: *Rainwater discharges, *Rain retention basins, Runoff yield.

Examples for the calculation of rainwater retention basins and compound basins, a combination of retention basin and settling basin, for complex sewer systems are presented. While both rainwater retention and settling basins are usually designed for a rain intensity of 40 liter/sec that occurs at a probability of about 10 times yearly, it is acceptable to reduce this value to 30 liter/sec to cut investment costs. Detailed calculations of runoff yield, inlet canal, heights of basin and canal, settling basin surface area, overflows, flow rates, and retention volumes are described. (Takacs-FIRL)
W74-11854

FURTHER PURIFICATION OF BIOLOGICALLY TREATED WASTE WATER TREATMENT PLANT EFFLUENTS BY MEANS OF MICROSTRAINERS (WEITERREINIGUNG BIOLOGISCH BEHANDELTER KLAERANLAGENABLAEUFE MIT HILFE VON MICROSTRAINERN),
B. Hanisch.
Gas-Wasser-Abwasser Vol 54, No 3, p 75-77, April, 1974. 6 fig.

Descriptors: *Water purification, *Waste water treatment, *Filtration, *Biological treatment, *Equipment, Suspended solids, Retention, Biochemical oxygen demand, Ultraviolet radiation, Filters, Costs.
Identifiers: *Microstrainers, Treatment plants, Suspended matter, Germany.

The principle and use of microstrainers for the reduction of the suspended matter content in biologically purified effluents in waste water treatment plants are described. The microstrainer is composed of a horizontal, slowly rotating drum covered by fine wire mesh serving as filter. The suspended matter settling on the inside of the drum acts as an additional filter. The proliferation of Zooglea is prevented by UV irridation. Experiences from the practical use of microstrainers in connection with biological waste water treatment plants and percolation bodies show that microstrainers are able to retain up to 60 percent of the suspended matter content, and to reduce the residual BOD content by about 50 percent. While the suspended matter retention efficiency of microstrainers is lower than that of rapid sand filters, microstrainers are superior to the latter in terms of lower investment costs and reduced susceptibility to great load variations. (Prague-FIRL)
W74-11856

BIOLOGICAL TREATABILITY OF LANDFILL LEACHATE,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
W. C. Boyle, and R. K. Ham.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 860-872, May, 1974. 4 fig, 14 tab, 5 ref.

Descriptors: *Biological treatment, *Biochemical oxygen demand, *Landfills, Pollutants, Organic matter, *Anaerobic treatment, Domestic wastes, Activated sludge, Oxygen, Solids, Liquors, Effluents, *Waste water treatment.
Identifiers: *Landfill leachates, Organic pollutants.

A substantial portion of the organic pollutants in sanitary landfill leachate can be removed by biological treatment. Anaerobic treatment of raw leachate provided more than 90 percent BOD reduction for hydraulic detention times greater than ten days at temperatures of 23 to 30C. Aerobic polishing of the anaerobic effluent produced BOD values proportional to surface water discharge. Leachate can be added to domestic waste water in an extended aeration activated a sludge plant at a level of at least five percent by volume without serious impairment of quality. At greater than five percent, leachate additions caused substantial solids production, increased oxygen uptake rates, and poorer mixed liquor separation. (Murphy-FIRL)
W74-11857

JET AERATOR HAS HIGH OXYGENATION CAPACITY.
Chemical Engineering, Vol 81, No 10, p 70, May 13, 1974.

Descriptors: *Jets, *Aeration, *Oxygen, Basins, Biochemical oxygen demand, Chemical oxygen demand, Equipment, Efficiency, Pumps, Lagoons, Oxidation, Liquors, Streams, Mixing, *Waste water treatment.
Identifiers: *Jet aeration, Basin geometry, Tank depth.

A jet aeration system has been developed which consumes less power and is much cheaper than pure-oxygen processes. Its system design is based on oxygenation capacities calculated from temperature, solids concentration, basin geometry, BOD, COD, and equipment efficiencies. The Eddy-Mix Jet Aeration system features fiber-flass ductwork, submersible heavy-duty pumps and large-diameter jets, and can be used in waste lagoons, oxidation ditches, or aeration tanks. Compressed air and recirculating liquor are brought into the jet and form small, entrained bubbles. The mixture is discharged on the bottom in a horizontal stream. Plumes are formed which provide turbulence. Unlike surface aeration systems, mixing is not limited by tank depth. (Murphy-FIRL)
W74-11858

VORTEX CLARIFIER ACHIEVES FAST SEPARATIONS.
Canadian Chemical Processing, Vol 58, No 4, p 32-33, April, 1974. 1 fig.

Descriptors: *Separation techniques, *Vortices, *Installation, Liquids, Solids, Water pollution control, Equipment, *Canada, Solids, *Waste water treatment.
Identifiers: *Vortex clarifier, Kingston, Ontario, Forced vortex, Retention time, Acceleration, Immiscible liquids.

A new clarifier has been designed by Queen's University Engineering Department, Kingston, Ontario and will have its first commercial use and installation by 1975. This clarifier will process 200 gallons per minute or more of liquids which contain less than one percent solids. It is designed to bridge the gap between centrifuges and settling tanks used for this purpose. The Bird Machine Company will use this 'forced vortex' in which the liquid in the cone rotates as if it were a solid body, minimizing fluid shear and hence turbulence. By applying large rotational accelerations (500 to 2000 g) the particles quickly agglomerate and reduce retention time to 40 seconds (rather than hours in a settling tank). Applications being considered are in recovering fibers from paper mill effluents and the reduction of water pollution. Possible future used include separation of immiscible liquids. (Prague-FIRL)
W74-11859

GAMMA RADIATION AS AN EFFECTIVE DISINFECTANT,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical and Civil Engineering.
K. L. Murphy.
Water and Pollution Control, Vol 112, No 4, p 24, 26, 28, April, 1974. 5 fig, 7 ref.

Descriptors: *Gamma rays, *Cobalt radioisotopes, *Disinfection, *Chlorination, Chlorine, Potable water, Water treatment, Laboratory tests, Energy, Contamination, Pilot plants, Toxicity, Fish, *Waste water treatment, *Canada.
Identifiers: *Gamma radiation, Cobalt 60, Laboratory studies, Energy consumption, Ontario.

Gamma radiation has not been used a disinfectant for waste waters primarily because of costs. However, while chlorine is currently the most widely used disinfectant for potable water treatment, serious questions have been raised about both its effectiveness and its possible toxicity over time. A further disadvantage of chlorine is its high energy consumption, especially in time of energy shortages. By laboratory studies, gamma radiation from radioactive cobalt 60 has been demonstrated to be an effective disinfectant; it cannot induce radioactivity or add to contaminants present. A pilot plant in Georgetown, Ontario was designed to test reactor efficiency, disinfecting ability of radiation, reactor performance, effect on soluble organics, and toxicity effects. Significant results on effectiveness of treatment and reproduction of an effluent non-toxic to fish were shown. Costs of cobalt are presently half the price of ten years ago. This coupled with a lower energy consumption as compared to chlorine, could make gamma radiation a viable alternative as a waste water disinfectant. (Prague-FIRL)
W74-11860

BRANDON SEWAGE PLANT FEATURES NOVEL CLARIFIER.
Water and Pollution Control, Vol 112, No 4, p 50-52, April, 1974.

Descriptors: *Waste water treatment, *Sewage treatment, *Biological treatment, *Aeration, *Anaerobic treatment, *Jets, Lagoons, Treatment facilities, Pilot plants, Clarification, Oxygen, Solids, Sludge, Temperature, Rivers, Bubbles, *Canada, Cold regions.
Identifiers: Settleable solids, Anaerobic lagoons, Aeration tanks, Penberthy jets, Brandon(Manitoba), Fine bubbles.

Specific problems exist in cold regions such as Brandon, Manitoba, where biological sewage treatment processes are difficult to maintain by conventional anaerobic lagoon methods. A new treatment facility is essentially an extended aeration plant, incorporating an aeration tank in which Penberthy jets are installed. These produce a stream of water and air simultaneously, and react to produce a fine bubble. These jets promote complete mixing action and are not prone to freezing, as the aerator is always submerged. Using a pilot plant, it was found that a completely-mixed system with effective clarification and sludge return is a very efficient system; it should not be critically affected by temperature variation, sludge quantity, or variation in oxygen content. An additional feature of the Brandon plant is a clarifier which removes settleable solids. This is done by a tube or set of tubes or a channel with flushing in the direction of the flow, with flushing water either directed to a separate basin or returned to the original basin. Essentially 100 percent of the sludge from the clarifier is returned to the aeration tank and eventually will be waste into the lagoon system. A full cycle of sewage treatment will consist of 24 hours of aeration, followed by clarification before discharge to a lagoon for three weeks storage, then cascading down an open channel to re-absorb a maximum oxygen before discharge to a river. (Prague-FIRL)
W74-11861

FLOOD PLAIN MANAGEMENT IN METROPOLITAN CHICAGO,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 6F.
W74-11867

CITY OF MANCHESTER--MAIN DRAINAGE WORK 6,
For primary bibliographic entry see Field 4A.
W74-11868

THE ESTUARY AND INDUSTRIAL WASTES: POWER PLANTS,
Burns and Roe, Inc., Oradell, N.J.
B. Intorre, and P. DeRienzo.
Hudson River Colloquium, Annals of the New York Academy of Sciences, Vol 250, p 169-177, May 24, 1974. 3 fig, 1 tab.

Descriptors: *Power plants, Boilers, Condensers, Turbines, Generators, *Industrial wastes, *Estuaries, Water pollution sources, Cooling water, Waste water treatment, *Treatment facilities.

The three major components of a power plant are a boiler or reactor, used to release the chemical or nuclear energy in the fuel by producing steam; a turbine generator, which converts the mechanical energy into electrical energy; and, a condenser which converts any remaining energy in the steam to the river water used for cooling. The operation of these components in an overall power cycle is discussed, highlighting those operations that generate potential contaminants. (Sandoski-FIRL)
W74-11869

SEWAGE ELECTROLYSIS,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
N. S. Wei, and G. W. Heinke.
Water and Pollution Control, Vol 115, No 5, p 31-32, 36, May, 1974.

Descriptors: *Reviews, *Electrolysis, *Sewage treatment, Chemical reactions, Patents, Technology, *Waste water treatment.

A state-of-the-art review of sewage electrolysis is presented. Electrolysis is a process in which chemical reactions are induced at each electrode-liquid interface through the application of an external electrical energy source to a system of electrodes immersed in a liquid. The review traces the commercial and scientific development of the process and includes an extensive patent survey. (Sandoski-FIRL)
W74-11871

SOME NUTRITIONAL CHARACTERISTICS OF SPIRULINA MAXIMA ALGAE GROWN IN EFFLUENTS FROM BIOLOGICAL TREATMENT PLANT,
University of Western Ontario., London. Faculty of Engineering Science.
For primary bibliographic entry see Field 5C.
W74-11872

PUBLIC USE AND EVALUATION OF RECLAIMED WATER,
California Univ., Berkeley. School of Public Health.
W. H. Bruvold, and H. J. Ongerth.
Journal of the American Water Works Association, Vol 66, No 5, p 294-297, May, 1974. 5 tab, 7 ref.

Descriptors: *Water reuse, Recreation facilities, Research and development, Evaluation, Surveys, *California, *Water utilization, *Attitudes, *Reclaimed water.
Identifiers: *Public opinion.

Insight into what the public currently thinks of various uses of reclaimed water has been developed through large-scale systematic research. The aims of present research are as follows: to study behavior of individuals regarding existing recreational facilities using reclaimed water; to measure attitudes toward various specific uses of reclaimed water; and, to develop the implications of the findings for innovative reuse projects. A summary of the methodology of the major field work, followed by general and attitudinal results are presented. Results are discussed and recommendations made. (Sandoski-FIRL)
W74-11878

RECOVERY OF HEAVY METALS FROM WASTE ACID (HAISAN KARA NO JUKINZOKU NO KAISHU),
A. Matsumura, Y. Matsuda, K. Masuyama, K. Murakami, and T. Imamura.
Sumitomo Denki, No 108, p 20-26, March 1974. 12 fig, 3 tab. English summary.

Descriptors: *Heavy metals, *Nickel, *Chemical wastes, *Waste water treatment, Separation techniques, Iron, Neutralization, Electrolysis, Copper, Chromium, *Acids.
Identifiers: *Japan.

The treatment of waste acid containing heavy metals has posed a problem in Japan even prior to the initiation of environmental control. A method for treating such acid waste has been investigated which permits the recovery of such valuable metals as copper, nickel, and chromium. Described is a process for separating nickel and iron by stepwise neutralization and recovering this nickel by electrolysis. (Sandoski-FIRL)
W74-11879

INDUSTRIAL WASTE WATER RECOVERY AND REUSE,
Betz Environmental Engineers, Inc., Plymouth Meeting, Pa. Dept. of Industrial Concept Design.
A. F. McClure.
Journal of the American Water Works Association, Vol 66, No 4, p 240-243, April, 1974. 3 photos.

Descriptors: *Recycling, *Industrial wastes, *Waste water treatment, Adsorption, Resins, Ion-exchange, Cations, Anions, Reverse osmosis, *Water reuse.

Ideas are presented about how industry may be able in the near future to treat a waste water stream and then, instead of discharging it, recycle it through all or part of the manufacturing process. Types of industrial reuse, the role of consultants, role of industrial management, and role of water-utility personnel were discussed. Treatments for reuse were discussed. It was emphasized that there are no set programs, but the following examples were cited: (1) Granular activated carbon provides for removal of organics by the adsorption of organic molecules. Although not the primary function, it will act as a filter and remove suspended solids; (2) Organic-adsorbent resins can be used to remove water-soluble organic materials from water; (3) Ion-exchange resins depending upon regenerant and resins used, can remove both cations and anions; (4) Electrodialysis uses an electric current to transport salts and other ionized materials through salt-permeable membranes; (5) Reverse osmosis uses pressure, in excess of osmotic pressure, to pass relatively pure water through a semipermeable membrane. (Jernigan-Vanderbilt)
W74-11914

JOINT CONSTRUCTION SEDIMENT CONTROL PROJECT,
Hittman Associates, Inc., Columbia, Md.; and Maryland Water Resources Commission, Annapolis.
For primary bibliographic entry see Field 4D.
W74-11923

SOIL SYSTEMS FOR MUNICIPAL EFFLUENTS - A WORKSHOP AND SELECTED REFERENCES,
East Central State Coll., Ada, Okla. School of Environmental Science.
R. H. Ramsey, C. R. Wetherill, and H. C. Duffer.
Copy available from GPO Sup Doc as EP1.16:16080 GWF 02/72, $0.65; microfiche from NTIS, Springfield, Va 22161 as PB-217 853, $2.25. Environmental Protection Agency, Water Pollution Control Research Series, February 1972. 58 p, 2 tab, 111 ref, 2 append. EPA Project 16080 GWF 02/72.

Descriptors: *Irrigation, *Infiltration, *Percolation, Bibliographies, Reviews, *Recycling, *Municipal wastes, *Water reuse, Waste disposal, Effluents, Soils.
Identifiers: *Soil systems, Workshop, User manual, State of art reports.

An investigation of the use of Soil Systems for recycling treated municipal waste effluents was conducted. The scope of the project included: the preparation of a user manual entitled Applying Treated Municipal Wastewater to the Land: Current Technology and an annotated bibliography of selected references in subject area. A state of the art investigation was made of the design, operation and control of irrigation and infiltration-percolation types of soil systems. The summarized results from this investigation were used by workshop participants selected from state, municipal, and federal agencies who were involved in soil system activities as a starting point in writing the manual. The workshop culminated in the preparation of a draft of the manual. The bibliography contains selections which portrayed or influenced the present state of art in the subject field. (EPA)

W74-11924

DEMONSTRATION OF A FULL-SCALE WASTE TREATMENT SYSTEM FOR A CANNERY,
Oklahoma Univ. Research Inst., Norman.
Leale E. Streebin, George W. Reid, and Alan C. H. Hu.
Copy available from GPO Sup Doc as EP1.16:12060 DSB 09/71, $1.50; microfiche from NTIS, Springfield, Va 22161 as PB-215 416, $2.25. Environmental Protection Agency, Water Pollution Control Research Series, September 1971. 181 p, 85 fig, 19 tab, 43 ref, 5 append. EPA Contract No 12060 DSB 09/71.

Descriptors: *Industrial wastes, Waste treatment, *Canneries, *Aerobic treatment, Sanitary engineering, Aeration, Biological treatment, *Waste water treatment, Food processing industry, *Activated sludge, Recycling.
Identifiers: *Food wastes, Waste characteristics, Aeration(Two-stage).

The objectives were to determine the removal efficiencies of a two-stage aerobic biological treatment system while processing high strength, large volume, nutritionally unbalanced cannery wastes, and to determine the waste characteristics resulting from the processing of a wide variety of fruits and vegetables. The system was studied over one operating season and data were collected on the removal efficiencies of each unit process in the system. The treatment system performed more efficiently than expected in the design assumptions. Removal efficiencies of greater than 95% were obtained for most of the processing season, even though because of plant expansion the organic and hydraulic load was higher than expected. It has been demonstrated conclusively that: (1) The Stilwell canning wastes can be treated successfully by a two-stage activated sludge process; (2) The two-stage aeration process is very stable and capable of accepting shock loads without being adversely affected; (3) The two-stage aeration process is a flexible system allowing adequate capacity for varying waste loads; that is, the units can be operated individually or in combination to match the flow and strength variations. This provides high treatment efficiencies at the lowest operational cost; (4) Any one of the units, such as the minimal solids unit, can be started up readily by recycling the mixed liquor from one of the operating units. (EPA)
W74-11925

TREATMENT OF WASTE WATER FROM THE PRODUCTION OF POLYHYDRIC ORGANICS.
Dow Chemical Co., Freeport, Tex. Texas Div.
Copy available from GPO Sup Doc as EP1.16:12020 EEQ 10/71, $1.75; microfiche from NTIS, Springfield, Va 22161 as PB-213 841, $2.25. Environmental Protection Agency, Water Pollution Control Research Series, October 1971. 198 p, 56 fig, 31 tab, 19 ref, 5 append. EPA Project 12020 EEQ 10/71.

Descriptors: *Waste water treatment, *Pilot plants, *Brines, *Biological treatment, *Solvent extractions, Carbon, Adsorption, Membranes, *Activated sludge, Estimated costs, Organic compounds, Alkalinity, Salts, Design.
Identifiers: *Glycol, Waste water characterization, Treatability, Pilot plant operation, Cost estimates, Polyhydric organics, Chlorohydrin process.

The brine waste water resulting from the production of glycols, by the chlorohydrin process, is characterized by high salt content (8-10% NaCl) excess alkalinity, and the presence of several organic compounds. Solvent extraction of the glycol waste water with amines produces a raffinate that is salt-saturated and a product enriched in glycol. The required large solvent-to-feed ratio and operation at near freezing temperatures make the process uneconomical. Adsorption of glycols on activated carbon was found unfeasible because of the low capacity of carbon for the glycols. Cellulose acetate membranes with low salt rejection were unable to significantly separate the salt and glycol. Activated sludge pilot plant was successfully operated for the treatment of an equalized glycol waste water. Removal of over 90% of the TOD at a retention time of 8.0 hours and loadings of 2.0 to 3.0 lbs. TOD/lb. MLVSS/day were obtained. Design parameters determined from pilot plant operation were used to design a 6 MGD treatment plant, at an estimated cost of 3.3 cents per pound of TOD removed or less than 0.2 cents per pound of propylene glycol produced. (EPA)
W74-11926

PHOSPHORUS REMOVAL BY AN ACTIVATED SLUDGE PLANT.
Milwaukee Sewerage Commission, Wis.
Copy available from GPO Sup Doc as EP1.16:17010 DXD 08/70, $1.00; microfiche from NTIS, Springfield, Va 22161 as PB-227 517, $2.25. Environmental Protection Agency, Water Pollution Control Research Series, August 1970. 95 p, 19 fig, 25 tab, 46 ref, 6 append. EPA Program 17010 DXD 08/70, Grants No WPD 188-01-67, 188-02-68, 188-03-69.

Descriptors: Phosphorus, *Activated sludge, *Waste water treatment, *Biological treatment, *Wisconsin, Treatment facilities.
Identifiers: *Phosphorous removal.

The overall total phosphorus removal in conventional activated sludge treatment plants at Jones Island, Milwaukee, Wisconsin, averages 80% as opposed to less than 50% in the majority of the activated sludge plants elsewhere in this country. A detailed plant-scale evaluation of the activated sludge process parameters was made over a period of three years to obtain optimum values for phosphorus removal. The total phosphorus removal generally followed the variations of the flow and BOD of the plant influent and was not dependent on the clarifier sludge blanket-depths. The BOD and the total phosphorus loading rate on the microorganisms and the MLSS concentrations were found to be of some significance in the removal of phosphorus. Total phosphorus removal was directly related to the solids (Milorganite) production. A significant portion of the phosphorus is insolubulized in the waste water before it reaches the plant. It is proposed that this is a probable cause for the higher total phosphorus removals obtained. It appears that brewery waste water aids soluble phosphorus removal at the Milwaukee plants. Limited studies with waste pickle liquor addition to the ML indicated that consistently higher soluble phosphorus removals can be obtained without any apparent detrimental effect on the process or equipment. (EPA)
W74-11927

PHOSPHORUS REMOVAL AND DISPOSAL FROM MUNICIPAL WASTE WATER.
Texas Univ., Galveston. Medical Branch.
Copy available from GPO Sup Doc as EP1.16:17010 DYB 02/71, $1.25; microfiche from NTIS, Springfield, Va 22161 as PB-218 415, $2.25. Environmental Protection Agency, Water Pollution Control Research Series, February 1971. 121 p, 18 fig, 13 tab, 40 ref. EPA Project 17010 DYB 02/71, Grant WPD 223-01-68.

Descriptors: Phosphorus, Salts, Absorption, *Waste water treatment, Municipal wastes, Waste disposal, *Texas, *Activated sludge, *Biological treatment, Operating costs, Treatment facilities.
Identifiers: *Phosphorus removal, Lime addition, Hydraulic overload, Sludge production, Metallic salts, Digester supernatant, *Iron salts, Aluminum salts.

Phosphorus removal was implemented at the full-scale, 1 mgd, Texas City, Texas Activated Sludge Plant. Over a two-year period, several techniques were investigated. Control of the plant operations to enhance biological removal of phosphorus was not a reproducible process. The most efficient means of controlling phosphorus was by the use of iron salts added to the raw waste water or primary effluent. Aluminum salts were slightly less effective. All aspects of plant operation were investigated, such as excess sludge production and drainability of digested sludge. Estimates of the operating costs associated with phosphorus removal are presented. (Barth-EPA)
W74-11928

A COMPUTER MODEL FOR EVALUATING COMMUNITY PHOSPHORUS REMOVAL STRATEGIES,
JBF Scientific Corp., Burlington, Mass.
D. S. Yeaple, D. A. Barnes, and F. A. DiGiano.
Environmental Protection Agency Report EPA 400/9-73/001, October 1973. 304 p, 25 fig, 14 tab, 60 ref. EPA Contract 68-01-0758.

Descriptors: Phosphorus, *Water pollution treatment, *Evaluation, *Costs, Local governments, *Computer models, Detergents, *Waste water treatment.
Identifiers: *Phosphorus removal strategies, Chemical treatment.

A computer model for evaluating a number of strategies for removing phosphorus in wastewater has been developed. The influence on total treatment cost of several non-treatment strategies such as the elimination of phosphates is detergents can be evaluated in terms of the treatment cost at local waste treatment plants. A review of phosphorus removal technology was conducted in order to determine what methods should be included as available techniques in a treatment strategy. Chemical precipitation techniques were selected as being both available and most effective at the present time and in the immediate future. The model reports to the user the total cost of a selected strategy for removing phosphorus. Over 21 treatment schemes with several sludge handling schemes can be selected and evaluated depending on local conditions. The computer guides the user through a series of questions and answers to develop a local profile and prediction of future conditions. (EPA)
W74-11931

EFFECTS OF WATER REUSE ON RAINBOW TROUT IN HATCHERIES,
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
For primary bibliographic entry see Field 5C.
W74-11940

PRELIMINARY STUDIES USING SYNTHETIC POLYMERS TO REDUCE TURBIDITY IN A HATCHERY WATER SUPPLY,
Alchesay National Fish Hatchery, Whiteriver, Ariz.
For primary bibliographic entry see Field 5C.
W74-11942

EFFECTS OF HATCHERY WATER REUSE ON RAINBOW TROUT METABOLISM,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
For primary bibliographic entry see Field 5C.
W74-11943

PROJECTIONS OF RADIOACTIVE WASTES TO BE GENERATED BY THE U.S. NUCLEAR POWER INDUSTRY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5G.
W74-11962

5E. Ultimate Disposal Of Wastes

LAND DISPOSAL OF WASTE WATER: PROCESSES, DESIGN CRITERIA, AND PLANNING CONSIDERATIONS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-11569

LAND APPLICATION OF SEWAGE EFFLUENTS AND SLUDGES: SELECTED ABSTRACTS,
Robert S. Kerr Environmental Research Laboratory, Ada, Okla.
For primary bibliographic entry see Field 5D.
W74-11577

DISPOSAL OF SOLID RADIOACTIVE WASTES IN BEDDED SALT DEPOSITS.
National Academy of Sciences. National Research Council, Washington, D.C. Committee on Radioactive Waste Management.
Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., $0.35/copy. November 1970. 28 p, 7 ref, append.

Descriptors: *Radioactive waste disposal, *Nuclear wastes, *Waste storage, *Mining, *Underground, Sodium chloride, Rock mechanics, Aquifers, Hydrology, Heat transfer, Plutonium, *Kansas.
Identifiers: *Salt mine, Lyons(KS).

To assist in the evaluation of AEC plans, the Committee on Radioactive Waste Management convened a Panel on Disposal in Salt Mines. Based on the recommendations of the panel, the Committee reached the following conclusions: (1) The use of bedded salt for the disposal of radioactive wastes is satisfactory. In addition, it is the safest choice now available, provided the wastes are in an appropriate form and the salt beds meet the necessary design and geological criteria. (2) The site near Lyons, Kansas, selected by the AEC is satisfactory, subject to the development of certain additional confirmatory data and evaluation. Initial disposal will be for low level solid waste material contaminated with plutonium and other long-lived transuranium nuclides. Subsequent disposal will include highly radioactive, high temperature, solidified wastes. (Houser-ORNL)
W74-11657

DEEP SELF-BURIAL OF RADIOACTIVE WASTES BY ROCK-MELTING CAPSULES,
New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
S. E. Logan.
Nuclear Technology, Vol 21, p 111-124, February 1974. 13 fig, 7 tab, 16 ref.

Descriptors: *Radioactive waste disposal, Geology, *Rocks, *Granites, *Basalts, *Rock properties, *Rock mechanics, Heat, Thermal radiation, Ablation, Cooling, Strontium, Cesium, Assessment, Safety, Evaluation, Model studies.
Identifiers: High-level waste, Descent data.

The rock-melting-capsule concept utilizes decay heat from high-level radioactive wastes in a container to melt rock. Descent by gravity achieves deep disposal. Molten rock resolidifies in the wake of the capsule, providing permanent isolation from the environment. Results calculated for: (1) waste categories of fission products, actinides, and Sr + Cs; (2) spherical capsule radii of 25, 50, and 100 cm; (3) waste oxide volume fractions of 0.15, 0.30, and 0.50; (4) basalt and granite rock types -- indicate adequate heat generation for rock melting, maximum depth increases with capsule size and waste concentration, with depths greater than 10 km obtainable by each waste category. Further work is recommended to investigate corrosion and erosion of refractory container materials in contact with waste oxide melts and molten rock. (Houser-ORNL)
W74-11664

TRITIUM CONTROL TECHNOLOGY,
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 5D.
W74-11673

EVALUATION OF A FIELD-TYPE INCINERATION FOR HUMAN WASTE, (THEATER OF OPERATION SEWAGE TREATMENT SYSTEMS),
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 5D.
W74-11785

COLOR REMOVAL AND SLUDGE DISPOSAL PROCESS FOR KRAFT MILL EFFLUENTS,
Continental Can Co., Inc., Hodge, La. Mill Operations Div.
For primary bibliographic entry see Field 5D.
W74-11803

PROCEEDINGS OF CONFERENCE ON LAND DISPOSAL OF MUNICIPAL EFFLUENTS AND SLUDGES,
Environmental Protection Agency, New York.
For primary bibliographic entry see Field 5D.
W74-11833

BIOLOGICAL TREATABILITY OF LANDFILL LEACHATE,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W74-11857

A BIBLIOGRAPHY ON OCEAN WASTE DISPOSAL.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
Available from NTIS, Springfield, Va 22161 as PB-224 452, Price $4.25 printed copy; $2.25 microfiche. Contract Report 4460C1542 for Environmental Protection Agency, May 1973. 105 p. EPA Contract 68-01-0796.

Descriptors: *Bibliographies, *Waste disposal, *Oceans, *Water pollution sources, Abstracts, Sea water.

This research bibliography is relevant to the field of ocean waste disposal. It is primarily limited to recent publications (January 1968-April 1973). Over four hundred documents are included; 74 of them are abstracted. A list of identifiers for computerized accession is included. (Knapp-USGS)
W74-11985

5F. Water Treatment and Quality Alteration

APPLICATION OF STATISTICAL TECHNIQUES TO THE SELECTION OF AN OPTIMAL POLLUTION TREATMENT PROGRAM,
Krannert Graduate School of Industrial Administration, Lafayette, Ind.
For primary bibliographic entry see Field 5D.
W74-11570

OBSERVATIONS ON MANGANESE IN GEORGIA WATERS,
Georgia Inst. of Tech., Atlanta. School of Applied Biology.
R. S. Ingols, and R. D. Wilroy.
Journal American Water Works Association, Vol 54, No 2, p 203-207, February, 1962. 12 ref.

Descriptors: *Manganese, *Water quality control, *Stratification, Destratification, Sedimentation, Oxidation, *Georgia, *Water treatment.
Identifiers: Chattahoochee River(GA), Lake Lanier(GA).

Manganese is frequently present in springs and in the bottoms of reservoirs. The water plant operator should determine the layer in which manganese is present and set the intake level to obtain water from the layer containing the lowest concentration. When however, the operator can do nothing to prevent the presence of manganese in the raw-water supply, it becomes necessary to oxidize the manganese to insoluble manganic hydroxide; this must be done before filtration, because after manganese passes through the filter, it can precipitate out in the clear well or pass on into the mains. The water utility with a small water supply reservoir could control manganese in the hypolimnion with an air jet to prevent stratification and introduce dissolved oxygen. If the reservoir is kept continuously agitated, dissolved oxygen deficiences cannot develop and the mineral manganese on rocks or in the mud at the pool bottom should remain insoluble. Artificial turnover would be the best way of attaining the highest quality of water available for potable purposes, at least as far as manganese and hardness are concerned. (Jernigan-Vanderbilt)
W74-11712

FURTHER PURIFICATION OF BIOLOGICALLY TREATED WASTE WATER TREATMENT PLANT EFFLUENTS BY MEANS OF MICROSTRAINERS (WEITERREINIGUNG BIOLOGISCH BEHANDELTER KLAERANLAGENABLAEUFE MIT HILFE VON MICROSTRAINERN),
For primary bibliographic entry see Field 5D.
W74-11856

GAMMA RADIATION AS AN EFFECTIVE DISINFECTANT,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical and Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-11860

SURFACE AGITATORS AS A MEANS TO REDUCE NITROGEN GAS IN A HATCHERY WATER SUPPLY,
Dworshak National Fish Hatchery, Ahsahka, Idaho.
For primary bibliographic entry see Field 5C.
W74-11936

A METHOD FOR INTEGRATING SURFACE AND GROUND WATER USE IN HUMID REGIONS,
Pennsylvania State Univ., University Park.
G. Aron, T. Rachford, J. Borrelli, and W. Stottmann.
Army Engineer Institute for Water Resources Contract Report 74-3, February 1974. 185 p, append. Army Contract DACW31-61-C-0057.

Descriptors: *Conjunctive use, *New York, *Cost-benefit analysis, *Water supply, *Municipal water, Water quality, *Water treatment, Computer programs, *Humid areas.
Identifiers: *Elmira(NY).

The role that groundwater should be accorded in future allocations of surface water storage for water supply is reviewed; the discussion is directed toward identifying circumstances under which integrated use of groundwater and surface water sources is economically and hydrologically desirable in humid areas like the Appalachian Region of the Eastern United States. For a case study, the Elmira, New York, water supply region

was selected. On the basis of the data collected at Elmira, the alternative of mixing conventionally treated Chemung River water with untreated groundwater in a proportion to yield a product of acceptable hardness, and followed by chlorination of the mixed water, would result in the least-cost water supply. The economically poor showing of the integrated reservoir-aquifer source combination was largely due to present regulations requiring full-scale treatment of all surface water supplies regardless of the degree of purity of the water source. (Knapp-USGS)
W74-11964

PROTOTYPE REVERSE OSMOSIS WATER PURIFICATION UNIT,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 3A.
W74-11988

5G. Water Quality Control

PLANNING AND ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 6A.
W74-11451

MEASURING DEVICES IN STATIONARY AND MOBILE CONTROL STATIONS FOR THE SUPERVISION OF RIVERS, SHOWN BY THE EXAMPLE OF THE LIPPE AND EMSCHER RIVERS,
Emschergenossenschaft, Essen (West Germany).
For primary bibliographic entry see Field 7B.
W74-11554

LOW ENERGY MECHANICAL METHODS OF RESERVOIR DESTRATIFICATION,
Oklahoma State Univ., Stillwater. School of Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W74-11572

SELECTED IRRIGATION RETURN FLOW QUALITY ABSTRACTS 1972-1973, THIRD ANNUAL ISSUE.
Dept. of Agricultural Engineering. EPA, Office of Research and Development Colorado State Univ., Fort Collins, Colo.
G. V. Skogerboe, W. R. Walker, R. S. Bennett, and B. J. Zakely.
Copy available from GPO Sup Doc as EP1.23:660/2-74-049, $3.85; microfiche from NTIS, Springfield, Va. 22161 as PB-235 385, $2.25. Environmental Protection Agency, Technology Series report EPA-660/2-74-049. June 1974. 409 p. EPA Program Element 1BB039. Grant No R-800426.

Descriptors: *Fertilizers, Irrigated land, Irrigated systems, *Irrigation water, *Nitrates, *Phosphates, *Return flow, *Salinity, Water pollution effects, Water pollution sources, Water quality control, *Bibliographies, *Abstracts.

Research related to the quality of irrigation return flow is being conducted at numerous institutions throughout the western United States. Related work is also underway at other institutions in the United States, as well as other portions of the world. Approximately 100 sources of material have been searched for articles pertinent to the National Irrigation Return Flow Research and Development Program. These articles describe water quality problems resulting from irrigated agriculture, potential technological solutions for controlling return flows, recent research pertinent to return flow investigations, and literature associated with institutional constraints in irrigation return flow quality control. This bibliography contains 820 abstracts. This third annual issue of SELECTED IRRIGATION RETURN FLOW QUALITY ABSTRACTS covers publications printed in 1972 and 1973. (EPA)
W74-11576

HYPOLIMNETIC FLOW REGIMES IN LAKES AND IMPOUNDMENTS,
Pennsylvania Univ., Philadelphia. Dept. of Civil and Urban Engineering.
For primary bibliographic entry see Field 8B.
W74-11578

MATHEMATICAL SIMULATION OF STREAM WATER QUALITY AT AMES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W74-11619

REGIONAL WATER SUPPLY AND WATER QUALITY CONCEPTS AND MANAGEMENT ALTERNATIVES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-11621

LEAST COST DESIGN OF BRANCHED PIPE NETWORK SYSTEM,
Weston (Roy F) Inc., West Chester, Pa.
For primary bibliographic entry see Field 8B.
W74-11647

NUCLEAR POWER AND PUBLIC OPINION,
Portland General Electric Co., Oreg.
R. L. Katren.
Health Physics, Vol 26, No 6, p 483-488, June 1974. 2 fig, 2 tab, 5 ref.

Descriptors: *Nuclear powerplants, *Phychological aspects, *Surveys, *Radioactivity effects, Environment, Environmental effects, Ecology, Aquatic life, Water pollution, Columbia River, Public health, Benefits, Training, Area redevelopment, Safety, Waste disposal, *Oregon, Attitudes.
Identifiers: *Public opinion, *Attitude survey.

A public opinion survey initiated in Oregon prior to construction of the first privately owned commercial nuclear plant in the region showed that approximately half of the population favored the plant. Initially, about one-third of the public had no opinion, with about one in five expressing negative views. Both indecision and negative views decreased as plans for and construction progressed. Women and those with no college tended to be more indecisive in their views. In general, opposition to the reactor was based on nuclear or radiological safety concerns. In particular, concern was sizeable in the area of agriculture, aquatic ecology, and water pollution. Evaluation of the opinions of various subgroups as well as other public opinion studies suggests how the health physicist can most effectively fulfill his role as an educator and public resource person. (Houser-ORNL)
W74-11656

REPORTS AVAILABLE IN PLOWSHARE OPEN FILE.
Nevada Operations Office (AEC), Las Vegas.
For primary bibliographic entry see Field 5B.
W74-11671

AN EVALUATION OF FARM IRRIGATION PRACTICES AS A MEANS TO CONTROL THE WATER QUALITY OF RETURN FLOW,
Utah State Univ., Logan.
For primary bibliographic entry see Field 3C.
W74-11681

PROCEEDINGS OF THE URBAN WATER ECONOMICS SYMPOSIUM.
Newcastle Univ. (Australia). Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-11682

A MULTIDISCIPLINARY POLICY DECISION MODEL FOR WATER POLLUTION,
Newcastle Univ. (Australia).
J. M. Dixon.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973, University of Newcastle, New South Wales, University of Newcastle Research Associates, Ltd, C. Aislabie, editor, p 49-60, 1973. 3 fig, 7 ref.

Descriptors: *Mathematical models, *Decision making, *Watershed management, *Economics, Dissolved oxygen, Pricing, River flow, Estuaries, Water quality, Pollution taxes, Water quality standards, Pollution abatement, Water pollution control, Australia.
Identifiers: Pareto optimum, Pigouvian solutions.

Because of the traditional reliance on administratively imposed standards, pigouvian solutions, i.e. taxation measures which cause the public and private marginal cost and marginal benefit functions to coincide, have been sought for many environmental problems. In this light a mathematical model was constructed for the Bremer estuarine reach in southeast Queensland. Effluent discharge along this reach includes two sewage outlets, two abattoirs, a hardboard mill and a sawmill. Dissolved oxygen was used as the water quality parameter, and effluent charges were taxed to the different dischargers. The computer model comprised two submodels, one economic, simulating the response of the effluent dischargers to tax imposition, and one physical, predicting the dissolved oxygen concentration along the reach for any given set of discharges. Advection and one dimensional eddy diffusion were used to model the tidal characteristics, and temperature and flow data available from 1969 modeled and riverflow conditions. Results from a variety of computer runs illustrated stream conditions for different taxation procedures. The option of effluent treatment was included in the model with a treatment cost estimating subroutine. The methodology described is a viable method for policy formulation and is generally applicable. Sensitivity analyses can further aid in determining which water quality parameters should be assigned highest priorities. (See also W74-11682) (LaPointe-North Carolina)
W74-11686

SOME ASPECTS OF URBAN WATER SUPPLY IN VICTORIA,
Victoria Water Commission (Australia).
For primary bibliographic entry see Field 6C.
W74-11687

WATER QUALITY INVESTIGATIONS ON FORESTED CATCHMENTS IN THE COTTER RIVER VALLEY,
Commonwealth Forestry and Timber Bureau, Canberra (Australia). Forest Research Inst.
For primary bibliographic entry see Field 5B.
W74-11692

MODELS FOR ALLOCATION OF WATER RESOURCES,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Building Research.
For primary bibliographic entry see Field 6A.
W74-11696

STANDARDS FOR THE PREVENTION OF OCCUPATIONAL LEAD POISONING,
Cincinnati Univ., Ohio. Kettering Lab.
For primary bibliographic entry see Field 5C.
W74-11714

ENVIRONMENTAL RESEARCH PUBLICATIONS, JANUARY 1971-JULY 1973.
National Environmental Research Center, Cincinnati, Ohio. Technical Information Office.
Available from NTIS, Springfield, Va. 22161 as PB-223 591, Price $3.00 printed copy; $2.25 microfiche. Report EPA-670/9-73-004, July 1973. 37 p.

Descriptors: *Bibliographies, *Environment, *Projects, *Research and development, *Water pollution control, Reviews, Waste disposal, Waste treatment.
Identifiers: *Environmental Protection Agency.

This List of Publications announces reports and publications of the Environmental Protection Agency's National Environmental Research Center, Cincinnati (NERC). This literature reports on results of scientific and engineering studies on pollution control technology performed by intramural activities of the NERC-Cincinnati laboratories or by cooperative activities with research and industrial organizations through contracts and grants. (Knapp-USGS)
W74-11746

CONTROL AND CONFINEMENT OF OIL POLLUTION ON WATER WITH MONOMOLECULAR SURFACE FILMS,
Naval Research Lab., Washington, D.C. Ocean Sciences Div.
W. D. Garrett, and W. R. Barger.
Available from NTIS, Springfield, Va. 22161 as AD-744 943 Price $3.50 printed copy; $2.25 microfiche. Memorandum Report 2451, June 1972. 58 p, 10 fig, 4 tab, 13 ref, 4 append. USCG 724110.1/4-1.

Descriptors: *Oil spills, *Water pollution control, Oily water, *Monomolecular films, Surfactants, *Oil pollution, *Pollution abatement.
Identifiers: *Oil spill cleanup.

Materials with which to form single-molecule-thick films that are capable of reducing the area covered by oil spilled on water were tested. These chemicals are able to maintain the oil in a layer up to a maximum of approximately one-half inch thick by preventing it from spreading over the water surface. If the oil has spread before adding the chemical, the monomolecular film pushes the oil back into a thicker layer. Such materials, classified as Collecting Agents by the National Contingency Plan, may be quite useful in increasing the efficiency of oil recovery devices, since all such devices perform better on thicker layers of oil. All materials investigated are commercially available in large quantities. Properties examined in this investigation included (1) freezing points, (2) viscosities, (3) specific gravities, (4) maximum film pressures achievable by the single-molecule-thick film, (5) relative durabilities of materials in monomolecular layers confining oil on water in motion, and (6) film pressures as a function of surface concentration of the monolayer forming materials. (Knapp-USGS)
W74-11781

EPA VIEWPOINT ON LAND APPLICATION OF LIQUID EFFLUENTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 5D.
W74-11844

LAND TREATMENT AND ENVIRONMENTAL ALTERNATIVES,
Natural Resources Defense Council, Washington, D.C. Project on Clean Water.
For primary bibliographic entry see Field 5D.
W74-11845

PROTECTION OF THE PUBLIC HEALTH,
Army Medical Environmental Engineering Research Unit, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5D.
W74-11849

EXPERIENCES WITH LAND SPREADING OF MUNICIPAL EFFLUENTS,
Robert S. Kerr Water Research Center. Ada, Okla.
For primary bibliographic entry see Field 5D.
W74-11850

NATIONWIDE EXPERIENCES IN LAND TREATMENT,
Metcalf and Eddy, Inc., Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W74-11851

A SURVEY OF LAND APPLICATION OF WASTE WATER FACILITIES,
American Public Works Association, Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-11852

POPULATION, RESOURCES, AND POLLUTION, AND THEIR IMPACT ON THE HUDSON ESTUARY,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-11870

A MATHEMATICAL MODEL OF TRANSPORT, DIFFUSION AND DEGRADATION OF ORGANIC MATTER IN A RIVER,
Newcastle-upon-Tyne Univ. (England). Dept. of Civil Engineering.
C. Nalluri.
Journal of the Institution of Engineers (India), Vol 54, Pt PH 1, p 1-6, October, 1973. 15 ref.

Descriptors: *Mathematical models, *Model studies, Rivers, *Organic matter, Biochemical oxygen demand, Dissolved oxygen, Heat, *Diffusion, *Degradation(Decomposition), Sediment transport, Water pollution control, *Path of pollutants.

A program suitable for solving the differential equations developed for calculations in polluted streams is described. The numerical method is easily programmable and economical in machine time and is easily extended to arbitrarily distributed grid points. (Sandoski-FIRL)
W74-11875

TREATMENT OF WASTE WATER FROM THE PRODUCTION OF POLYHYDRIC ORGANICS.
Dow Chemical Co., Freeport, Tex. Texas Div.
For primary bibliographic entry see Field 5D.
W74-11926

EVALUATION OF IRRIGATION SCHEDULING FOR SALINITY CONTROL IN GRAND VALLEY,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
G. V. Skogerboe, W. R. Walker, J. H. Taylor, and R. S. Bennett.
Copy available from GPO Sup Doc as EP1.23:660/2-74-052, $1.30; microfiche from NTIS, Springfield, Va 22161 as PB-235 633, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-052, June 1974. EPA Program Element 1BB039. S-800278.

Descriptors: Colorado River, *Deep percolation, Irrigation, Irrigation effects, *Irrigation efficiency, Irrigation water, *Return flow, Saline soils, Saline water, Salinity, Water distribution(Applied), Water loss, Water pollution sources, Water quality, *Colorado.
Identifiers: *Grand Valley(CO), Irrigation scheduling, *Salinity control.

Although the results of this study indicate that existing programs for irrigation scheduling in the Grand Valley to control salinity are having only a marginal effect, the potential for 'scientific' irrigation scheduling has been well established. Also, irrigation scheduling should not be taken individually as a salinity control measure because its effectiveness is not exclusive of the operation of the total irrigation system. Thus, irrigation scheduling is a necessary, but not sufficient, tool for achieving improved irrigation efficiencies. The real strides in reducing the salt pickup resulting from over-irrigation will comefrom the employment of scientific irrigation scheduling in conjunction with improved on-farm irrigation practices. This combined effect could result in a reduction of 300,000 tons annually of salt pickup from the Grand Valley, depending upon the degree of improvement in present on-farm irrigation practices. (EPA)
W74-11929

ECONOMIC DAMAGES TO HOUSEHOLD ITEMS FROM WATER SUPPLY USE,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
D. P. Tihansky.
Copy Available from GPO Sup Doc as EP1.23:600/5-73-001, $1.30; microfiche from NTIS, Springfield, Va 22161 as PB-237 716, PC$3.00/$2.25 MF. Environmental Protection Agency, Socioeconomic Studies Series Report EPA-600/5-73-001, July 1973. 86 p, 7 fig, 10 tab, 50 ref. Program Element 1H1094.

Descriptors: *Domestic water, *Water quality, *Economic impact, *Damages, Estimated benefits, Engineers estimates, Computer models, Annual benefits, Water supply, Water utilization, Model studies, Costs, Computer programs.

Household appliances and personal items in contact with water supply are subject to physical damages from chemical and other constituents of the water. This study translates these damages into economic losses for a typical household. Then it aggregates these losses at the national and individual state levels. To do so requires several stages of analysis. First, the types of physical damages expected and associated water quality determinants are identified. The physical effects are next translated into economic losses. Second, damage functions are formulated to predict likely impacts of water quality changes on each household unit affected. Third, a computer program based on these functions is designed to estimate total damages per typical household and to aggregate them over selected regions. Finally, the program is applied to state-to-state data on water supply sources and socioeconomic descriptors. Total damages to U.S. residents in 1970 are estimated in the range, $0.65-$3.45 billion, with a mean of $1.75 billion. The mean translates into $8.60 per person. States contributing most to total damages are California ($230 million) and Illinois ($164 million). On a per capita basis Arizona ($22.53) and New Mexico ($18.58) rank highest, whereas South Carolina ($1.15) and Oregon ($1.73) are at the other end of the spectrum. When per capita damages are compared by source of water supply, those from private wells are worst at an average of $12.34, treated groundwater next at $11.20, and treated surface water sources at only $5.83. (EPA)
W74-11930

SUMMERTIME ARTIFICIAL AERATION INCREASES WINTER OXYGEN LEVELS IN A MICHIGAN LAKE,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W74-11939

A DEVICE FOR ALLEVIATING SUPERSATURATION OF GASES IN HATCHERY WATER SUPPLIES,
Bureau of Sport Fisheries and Wildlife, Boston, Mass.
For primary bibliographic entry see Field 5C.
W74-11941

FACTORS INFLUENCING FORMALIN TOXICITY IN TROUT,
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
For primary bibliographic entry see Field 5C.
W74-11947

PROJECTIONS OF RADIOACTIVE WASTES TO BE GENERATED BY THE U.S. NUCLEAR POWER INDUSTRY,
Oak Ridge National Lab., Tenn.
J. O. Blomeke, C. W. Kee, and J. P. Nichols.
Available from NTIS, Springfield, Va. 22161 as Rept. No ORNL-TM-3965; $5.45/copy, $2.25/microfiche. Report No ORNL-TM-3965, February 1974. 116 p, 3 fig, 76 tab, 26 ref, 2 append.

Descriptors: *Radioactive waste disposal, *Projections, *Forecasting, Evaluation, Nuclear powerplants, Effluents, Design criteria, Research and development, Research facilities, Planning, Fuels, Iodine, Plutonium, Waste storage, Radioisotopes.
Identifiers: *Waste management, *Fuel reprocessing, Fuel cycle.

Projections of the industrial radioactive wastes from the nuclear cycle are useful in the planning and design of methods and facilities that will be needed for their future management, and for the assessment of potential environmental effects. With greater emphasis currently being given to the development of nuclear energy resources, including the development and demonstration of the most practicable methods of managing the radioactive wastes therefrom, more current and comprehensive projections are required. The present study was made to fulfill this need. Ten types of radioactive wastes to be generated within the fuel cycle operations of the U.S. nuclear power industry are defined, and projections are presented of their annual generation rates, shipping requirements, and accumulated characteristics over the remainder of this century. The power complex is assumed to consist of uranium- and plutonium-fueled LWRs, HTGRs and LMFBRs, and the installed nuclear electric capacity of the U.S. is taken as 134, 504, and 1200 GW at the ends of calendar years 1980, 1990, and 2000, respectively. (Houser-ORNL)
W74-11962

ENERGY--A SPECIAL BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-11966

ENERGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-11967

BIODEGRADATION OF OIL IN SEA WATER FOR NAVAL POLLUTION CONTROL,
Naval Civil Engineering Lab., Port Hueneme, Calif.
T. B. O'Neill.
Available from NTIS, Springfield, Va 22161 as AD-763 342, Price $3.00 printed copy; $2.25 microfiche. Annual Report No 3, April 1973. 12 p, 7 tab, append. ONR Contract NR306-883.

Descriptors: *Biodegradation, *Oil spills, *Water pollution treatment, Aquatic bacteria, Water pollution control, Aquatic microorganisms.

Microorganisms that possess the ability to oxidize hydrocarbons were studied. Over a hundred different hydrocarbonoclastic organisms have been secured either from local marine coasts or from collections. These cultures include molds and yeasts as well as bacteria. The cultures are readily maintained on conventional media. The maximum hydrocarbon loss in any single experiment involving a pure culture of bacteria was 11%. (Knapp-USGS)
W74-11976

HYDROLOGY AND RECREATION ON THE COLD-WATER RIVERS OF MICHIGAN'S UPPER PENINSULA,
Geological Survey, Lansing, Mich.
For primary bibliographic entry see Field 6B.
W74-11986

MICROBIAL DEGRADATION OF DDT,
Cornell Univ., Ithaca, N.Y. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-11992

RESEARCH PROSPECTUS FOR MARINE POLLUTION CONTROL IN THE GREAT LAKES.
Kearney (A.T.), Inc., Chicago, Ill.
Available from NTIS, Springfield, Va 22161 as COM-73-10677, Price $6.75 printed copy; $2.25 microfiche. Report for Department of Commerce Maritime Administration, August 1972. 209 p, 10 ref.

Descriptors: *Water pollution control, *Great Lakes, Ships, Navigation, Oil pollution, Municipal wastes, Water pollution sources, Reviews, Projects, Research and development.

The present status of the marine pollution problems of the Great Lakes and their relation to the merchant ships operating thereon, including municipal laws, state laws, and EPA implementation of the Water Quality Act of 1970 and other Federal legislation, and Canadian legislation are reviewed and summarized. Research projects and information programs needed for soliciting requests for proposals are recommended. (Knapp-USGS)
W74-12000

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

PLANNING AND ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
E. A. McBean, and D. P. Loucks.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 257; $17.00 in paper copy, $2.25 in microfiche. Technical Report No 84, June 1974. 122 fig, 19 tab, 492 equ, 541 ref. OWRR W-146(3753)(1).

Descriptors: *Systems analysis, *Water resources development, *Mathematical models, *Optimum development plans, Economic efficiency, Design criteria, Management, Cost-benefit analysis, Decision making, Distribution systems, Waste water treatment, Flood control, Groundwater, Long-term planning, Regional analysis, Scheduling, Synthetic hydrology, *Reviews.
Identifiers: *Metropolitan areas.

Presented is a critical review and analysis of the application of management science and operations research techniques to the solution of metropolitan water resources planning and management problems. The review focuses specifically on the effects of hydrologic risk and economic, political and technologic uncertainty. The report is divided into chapters that discuss particular metropolitan water resources problems, e.g., flood damage, water supply, water quality, demand forecasting, etc. Alternative methodologies are introduced and applied to a variety of metropolitan water resources problems, illustrating their advantages and limitations for providing useful information for investment and operating decisions. This critical review is based on the state-of-the-art as reflected in over 500 documents (e.g., books, journals, technical reports) which report on the application of systems analysis, i.e., optimization techniques, decision theory, probability theory, simulation analysis, and stochastic processes, to the development and management of water resources in metropolitan areas. A number of example problems illustrates some of the theoretical principles and applications discussed. (Bell-Cornell)
W74-11451

A BAYESIAN APPROACH TO HYDROLOGIC TIME SERIES MODELING,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
G. J. Vicens, I. Rodriguez-Iturbe, and J. C. Schaake.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 256; $6.75 in paper copy, $2.25 in microfiche. Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Report No 181, March, 1974. 286 p, 51 tab, 24 fig, 47 ref, 7 append. OWRTC-4118(9021)(4). NSF GK-41643x.

Descriptors: *Synthetic hydrology, *Regression analysis, *Risks, *Time series analysis, Stochastic processes, Model studies, Streamflow, Planning, Design criteria, *Regional analysis.
Identifiers: *Bayesian methods.

Most water resources designs are problems of decision-making under uncertainty. Simulation models and synthetic streamflow generation are two techniques presently used to assess the impact of these uncertainties. But only the natural uncertainties of the streamflows are accounted for. Informational uncertainties, both about the parameters and the models, due to relatively short historical records, are largely ignored. This work has two objectives. First, to develop a procedure that explicitly accounts for the parameter uncertainties in water resources planning; and second, to investigate the use of regional information in conjunction with the historical record to reduce the parameter uncertainties. To attain these goals, Bayesian procedures have been applied to the following hydrologic time series models of annual streamflows: (1) Independent Normal Process, (2) Independent Log-Normal Process, (3) First-Order Normal Autoregressive Process, and (4) First-Order Log-Normal Autoregressive Process. To obtain prior information, regression models and subjective judgements have been used to process the available regional information. A design example showed that the Bayesian procedure is superior to traditional procedures which ignore parameter uncertainties. In addition, various examples of combining regional information with the at-site historical record show that this approach reduces

the parameter uncertainties. These conclusions are especially true when the river of interest has high variance, serial correlation, and/or relatively short historical record.
W74-11456

METROPOLITAN WATER INTELLIGENCE SYSTEMS--COMPLETION REPORT, PHASE III,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-11457

APPLICATION OF STATISTICAL TECHNIQUES TO THE SELECTION OF AN OPTIMAL POLLUTION TREATMENT PROGRAM,
Krannert Graduate School of Industrial Administration, Lafayette, Ind.
For primary bibliographic entry see Field 5D.
W74-11570

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, FIFTH VOLUME,
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 336, $8.50 in paper copy, $2.25 in microfiche. Water Resources Scientific Information Center, Report WRSIC 74-206, 405 p.

Descriptors: *Systems analysis, *Bibliographies, *Water resources, Optimization, Simulation analysis, Operations research, Abstracts, Mathematical models, Systems analysis, Water supply, Irrigation, Linear programming.

This is an annotated bibliography of 265 abstracts of selected publications issued in 1973 pertaining to the application of systems analysis techniques for defining and evaluating alternative solutions to water resource problems. The first two volumes of this bibliography, having the same title, were published by the Cornell University Water Resources and Marine Sciences Center, Ithaca, New York (Publication 25, August 1969; Publication 35, June 1971); the third and fourth volumes were published by the Water Resources Scientific Information Center in December 1972 and December 1973, respectively. Both subject the author indexes are provided. Descriptors are listed with each abstract. The abstracted material emphasizes the application of optimization and simulation techniques for assisting in the planning and management of water resource systems.
W74-11574

THE USE OF STATISTICAL DISTRIBUTIONS FOR DETERMINING THE MAGNITUDE AND FREQUENCY OF FLOODS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
C. E. Beer, and R. L. Rossmiller.
In: Ames Reservoir Environmental Study. Appendix 4. Physical Relationship with the Agricultural Sector, Iowa State Univ. Report ISWRRI-60-A4, 1973, p 4-6-i--4-6-28. 4 fig, 7 tab, 10 ref.

Descriptors: *Flood forecasting, *Flood discharge, *Statistical methods, Iowa, Flood data, Flood frequency, Hydrograph analysis, Flood profiles, Mathematical studies, Flood recurrence interval, Frequency analysis.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Alternative flood frequency distributions may be chosen to represent hydrologic conditions within watersheds through the use of sampling data. Such predicted hydrological data can be used to project optimum water management policies to deal with potential flooding conditions. Projections from each of the possible frequency distributions may vary significantly however, creating some uncertainty as to the optimal management plan. A number of frequency functions including the log normal, gamma, extreme value functions of type I-largest and type III-smallest, log Pearson type III and Weibull are considered. Each distribution is characterized by differing parametric values (e.g., scale factor, shape factor) which describe the population. Efforts by the Iowa Natural Resources Council to calculate low-frequency relationships are also documented. The variability of predicted flood discharges for Iowa's Skunk River utilizing log normal, log-Pearson and regional equations is illustrated. In general, variability increased with larger return periods, the log-normal distributions yielding the largest predicted value. The impact on skew coefficients and variability of outliers are also examined for 170 Iowa streams. When the low value (outlier) was excluded the coefficient of skew increased positively and variability between distribution declined. (See also W74-11605) (Schroeder-Wisconsin)
W74-11611

MATHEMATICAL SIMULATION OF STREAM WATER QUALITY AT AMES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
P. Pins, and M. D. Dougal.
In: Ames Reservoir Environmental Study. Appendix 5. Physical Relationship with the Urban Sector, Iowa State Univ. Report ISWRRI-60-A5, 1973, p 5-5-i--5-5-135. 18 fig, 19 tab, 19 ref, addendum.

Descriptors: *Mathematical models, *Cities, *Water quality, Iowa, Forecasting, Population, Rivers, Reservoirs, Effluents, Water pollution control, Biochemical oxygen demand, Algae, Reaeration, Waste water(Pollution), Flow, Waste water treatment, Dissolved oxygen, Low flow frequency.
Identifiers: *Ames(IA), *Skunk River(IA).

The Iowa State University's water quality model was designed to estimate the relationship between stream quality and selected stream and effluent parameters of the Skunk River at Ames, Iowa by providing spatially defined diurnal variations. Control of variables and data requirements for the model include estimates of population growth, and variations in water and waste water levels, flows, and qualities. Water quality variables evaluated by the model include chemical composition, stream flow, and dissolved oxygen levels, each depicted spatially. It is also used to predict requisite changes in Ames' treatment plant effluent parameters over time to satisfy existing state and federal water quality requirements. For 1970 conditions, and ordinary secondary treatment methods, the existing water quality standards would be violated during late summer, fall, or winter at low flow conditions at or more severe than the once-in-two-year frequency events. For 1995 projected conditions, utilizing low or medium population estimates, warm water aquatic environment stream standards can only be met with advanced treatment at Ames. Trade off levels between three constituents affecting DO levels are provided through the model. A brief compendium of other ISU studies broadening the understanding of relationships within the stream environment is provided. (See also W74-11614) (Schroeder-Wisconsin)
W74-11619

URBAN WATER RESOURCES--SOME PLANNING FUNDAMENTALS,
Cornell, Howland, Hayes and Merryfield, Reston, Va.
For primary bibliographic entry see Field 6B.
W74-11645

LEAST COST DESIGN OF BRANCHED PIPE NETWORK SYSTEM,
Weston (Roy F) Inc., West Chester, Pa.
For primary bibliographic entry see Field 8B.
W74-11647

A SURVEY OF PAPERS ON ECOSYSTEMS ANALYSIS FROM 1947-1971 IN THE JOURNAL 'ECOLOGY',
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11668

A MULTIDISCIPLINARY POLICY DECISION MODEL FOR WATER POLLUTION,
Newcastle Univ. (Australia).
For primary bibliographic entry see Field 5G.
W74-11686

TOWARDS A MODEL FOR PREDICTION OF RESIDENTIAL WATER USE,
Hunter Valley Research Foundation, Tighes Hill (Australia).
G. McCalden.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973. University of Newcastle, New South Wales. University of Newcastle Research Associates Ltd., C. Aislabie, editor, p 99-111, 1973. 9 ref.

Descriptors: *Mathematical models, *Water users, *Water demand, *Regression analysis, *Water consumption, Statistical methods, Statistical models, Distribution systems, Population, Weather, Climates, Income, Age, Swimming pools, Monitoring.
Identifiers: Household metering, Residential use.

This proposed model for determining future residential water use consists of 4 major sets of determinants: (1) population characteristics in the area served; (2) use characteristics of the population subgroups; (3) variations in weather and climate; and (4) characteristics of the supply and distribution systems and its sociopolitical milieu. Previous work has simply defined a per capita consumption coefficient, but a superior model is possible by breaking the population into different subgroups each with its own consumption coefficient. Population subgroups could be defined according to age, income. or lifestyle. Similarly, a distinction should be made, and included in the model, between individuals as water users, and as owners of water using adjuncts like washing machines, swimming pools, or gardens. Weather and climate should be broken down into random, seasonally determined, and locationally determined characteristics. The major difficulty in the model would be the determination of the various use coefficients. Multiple regression analysis is suggested to first determine coefficients for population age groups, and household characteristics. Households could be metered at different intervals (2 or 3 months for seasonal data) for at least a year to provide the necessary data. The determinants so calculated would provide a firmer basis for pricing policy, for planning user education programs, and for formulation of controls. (See also W74-11682) (LaPointe-North Carolina)
W74-11691

MODELS FOR ALLOCATION OF WATER RESOURCES,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Building Research.
R. Sharpe.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973. University of Newcastle, New South Wales, University of Newcastle Research Associates Ltd., C. Aislabie, editor, p 171-176, 1973. 6 ref.

Descriptors: *Computer models, Water resource development, *Planning, Management, *Systems analysis, *Benefit cost analysis, Constraints, Land use, *Water allocation, Water supply develop-

ment, Domestic use, Sewage disposal, Drainage systems, Optimum development plans, *Australia.
Identifiers: Melbourne(Aust).

TOPAZ (Technique for the Optimum Placement of Activities into Zones) is a hierarchical planning model that incorporates engineering and economic planning at various levels from national to building layouts. The model was constructed to allow key decisions to be transformed to lower level constraints. Interactions between levels are quantified and upwards feedback can refine decisions. National level activities include apportionment of population, industry, capital, agriculture and commerce. Regional and urban levels further allocate these apportionments in addition to managing natural resources, recreation, and conservation. Thorough planning of water resources and their myriad uses requires a multi-level methodology such as the TOPAZ model; however the particular role of water in different problems necessitates individual solutions. Melbourne is currently engaged in a long range planning study to the year 2000. The criterion used is to maximize benefits less costs. Whereas current data are crude, submodels are proposed for each service, a sewerage submodel having already been developed. Submodels can be used separately or independently in the TOPAZ scheme. A specialized TOPAZ model of the siting of dams, hydro-power plants, rural and urban areas has been formulated which maximizes benefits less costs. Another specialized model allocates various land uses including forestry, agriculture, mining, national parks, and water storage within a water catchment area. These models allow interested parties an opportunity to determine objectives and constraints. (See also W74-11682) (LaPointe-North Carolina)
W74-11696

TOCKS ISLAND LAKE PROJECT,
Tippetts-Abbett-McCarthy-Stratton, New York.
G. T. McCarthy.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE4, Proceedings Paper 10718, p 803-805, August 1974. 1 ref, append.

Descriptors: *Delaware River, *River basins, *Water supply, *Systems analysis, River basin development, Water sources, Inter-basin transfers, Dams, Hydrology, Delaware River Basin Commission, Water requirements, Water storage, Water supply development, Droughts, Low flow, Hydrologic budget, Simulation analysis, Hydrologic systems, Water demand, Environmental engineering, Tidal streams, Diversion, Saline water intrusion.
Identifiers: *Tock's Island Dam(Delaware River Basin).

The consequences of not constructing Tocks Island Reservoir from the standpoint of water supply was examined based on the results of a computerized system analysis of the basin. The analysis considered a recurrence of the 1960's drought, legal flow constraints, estimated 1986 and 2020 consumptive water use including power requirements and out-of-basin diversions to New Jersey, storage reservoirs included in the Basin Comprehensive Plan, and restraints on consumptive use when flow to the estuary was less than the estimated 3,000 cfs needed to contain the salt wedge below the Philadelphia water supply intake at Torresdale. Results of the study using 1986 demands indicated a minimun flow below Trenton with all planned reservoirs of 3,450 cfs; with all reservoirs except Tocks Island, 2,410 cfs; and less than 1,750 cfs with no new reservoir. Both the latter flows represent unsafe conditions considering the salt wedge. Based on demands in 2020, conditions would be worse. (Humphreys-ISWS)
W74-11891

DOCUMENTATION FOR SNSIM1/2, A COMPUTER PROGRAM FOR THE STEADY-STATE WATER QUALITY SIMULATION OF A STREAM NETWORK,
Environmental Protection Agency, New York. Data Systems Branch.
For primary bibliographic entry see Field 5B.
W74-11978

6B. Evaluation Process

A BAYESIAN APPROACH TO HYDROLOGIC TIME SERIES MODELING,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W74-11456

METROPOLITAN WATER INTELLIGENCE SYSTEMS--COMPLETION REPORT, PHASE III,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-11457

GEOLOGIC IMPLICATIONS,
Iowa State Univ., Ames. Dept. of Earth Science.
L. V. A. Sendlein.
In: Ames Reservoir Environmental Study, Appendix 1 - Vol 2. Natural and Archaeological Resources of the Reservoir Site and Stream System, Iowa State Univ. Report ISWRRI-60-A1-Vol 2, 1973, p 1-2-i--1-2-21, 6 fig, 2 tab, 5 ref.

Descriptors: *Reservoir sites, *Iowa, Geologic formations, Reservoirs, Geology, Geologic investigations, Geologic mapping Hydrogeology, Future planning(Projected), Quarries, Limestones, Gravels, Land resources.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

The geology and geohydrology in the Skunk River Valley, site of the Ames Reservoir, are described. The stratigraphy indicates that the St. Louis formation (Mississippian) outcrops in bluff walls on the right abutment and in quarries just south and north of the axis of the dam. A yellow sandstone also outcrops in the west abutment of the dam. Structural maps provided indicate that a series of small faults extend northeast-southeast. The axis of the dam lies directly on a small fault on steep flexure. Boreholes also substantiate that the bedrock valley has its thalweg 800 feet below sea level and 60 feet below the bedrock evaluation beneath the proposed axis of the dam. Surficial material of the flood plain is composed of a thin layer of 0-5 feet of organic silt. This material is underlain of intermixed sand and gravel to bedrock. South of the dam axis the bedrock is exposed at the surface in the valley wall and in limestone quarries. Under the proposed reservoir design most sand and gravel deposits will be lost due to flooding. Land containing limestone, while not flooded may be limited due to increased demand for recreational land. Impacts on groundwater levels are also evaluated. (See also W74-11579) (Schroeder-Wisconsin)
W74-11580

LIMNOLOGICAL AND FISHERIES ASPECTS OF THE RIVER AND THE PROPOSED RESERVOIR,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
R. W. Bachman, and C. L. Olson.
In: Ames Reservoir Environmental Study. Appendix 1 - Vol 2. Natural and Archaeological Resources of the Reservoir Site and Stream System, Iowa State Univ. Report ISWRRI-60-A1-Vol 2, 1973, p 1-4-i--1-4-80, 8 fig, 10 tab, 32 ref.

Descriptors: *Fisheries, *Limnology, *Rivers, *Reservoirs, *Environmental effects, Physical properties, Chemical properties, Iowa, Anadromous fish, Rough fish, Fish populations, Preimpoundment, Postimpoundment, Tailwater, Recreation.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Benefits from improved sports fisheries of the proposed Ames Reservoir in Iowa depend primarily upon the reservoir's impact on the biological, physical, and chemical environment. Limnological studies of the Skunk River indicate that the geological change from that of rock and gravel near the impoundment to shifting sand below significantly affect the present fish population. Two recent surveys show a more diverse fish population existing above the geologic change with 35-36 species reported. Studies of the impact of the reservoir on stream characteristics including turbidity, DO, thermal stratification, and water quality indicate that the combination of nutrient levels in the river and the relatively long turnover rate of the reservoir mean that the impoundment will be a fertile body of water. Stream fish including smallmouth bass will be eliminated to be replaced by a characteristically large population of rough fish and varying levels of game fish depending on management practices. The poor quality of the river below the reservoir combined with the variable quality of the outflow precludes establishment of a substantial tailwater fishery. (See also W74-11579) (Schroeder-Wisconsin)
W74-11582

SOME ESTIMATED IMPACTS OF THE PROPOSED AMES RESERVOIR UPON WILDLIFE,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
M. K. Petersen.
In: Ames Reservoir Environmental Study. Appendix 1 - Vol 2. Natural and Archaelogical Resources of the Reservoir Site and Stream System, Iowa State Univ. Report ISWRRI-60-Al-Vol 2, 1973. 1-5-1--1-5-54. 9 tab, 32 ref.

Descriptors: *Reservoirs, *Wildlife habitats, *Environmental effects, Postimpoundment, Preimpoundment, Iowa, Birds, Mammals, Wildlife, Decision making, Economic impact.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Impacts of Iowa's proposed Ames Reservoir upon the region's wildlife was surveyed. During two months in 1972, 15 four-man teams were assigned specific habitats within the adjoining area, ranging from 0.3-40 acres. Team activities included interviewing local landowners, cover mapping, habitat analysis and evaluation, and wildlife population census. Landowners generally opposed the reservoir construction with monetary and emotional attachments most often cited as reasons. The landowners supporting the impoundment noted economic gains. A summary of wildlife population density and habitat quality data derived from the survey indicates that the entire proposed reservoir site is composed of only fair wildlife habitats and less than fair population densities of most species. Possible distortions of these values are noted, however. Wildlife management recommendations are that the reservoir land immediately surrounding the impoundment should be purchased and intensively managed for wildlife and erosion control. Development adjacent to the reservoir should also be minimized. Estimates of total economic losses associated with wildlife ($174,292) indicate that more benefits will accrue from the reservoir than losses. (See also W74-11579) (Schroeder-Wisconsin)
W74-11583

AMES RESERVOIR ENVIRONMENTAL STUDY. APPENDIX 2. ECONOMIC AND SOCIAL IMPACT,
Iowa State Water Resources Research Inst., Ames.

Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 401, $19.00 in paper copy, $2.25 in microfiche. Report ISWRRI-60-A2 (IURR-FRS-9-A2), 1973. 319 p, 6 fig, 20 tab, 67 ref. OWRT A-999-IA (8b).

Descriptors: *Reservoir construction, *Cost benefit theory, *Project planning, *Decision making, *Multiple-purpose projects, *Iowa, Social adjustment, Reservoir design, Indirect costs, Benefits, Social aspects, US Water Resources Council, Standards, Regional development, Water policy, Indicators, Direct costs, Value engineering, Systems analysis, Social participation, Input-output analysis, Water resources development, Wildlife, Water utilization, Flood damage, Recreation, Regional economics, Planning, Legislation, Government finance, Highway relocation, Land use, Land development, Property values, Evaluation.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Social and economic impacts of Iowa's Ames Reservoir are discussed in three parts. In Part I, a number of economic issues are considered. Chapter 2 reviews the state-of-the-art and emerging government directives related to project evaluation. Chapter 3 addresses itself to the identification of relevant impacts. A proposed methodology traces the relationship of alternative reservoir designs to relevant impacts and discusses appropriate display methods to aid public participation in decision making. Chapter 5 discusses potential values to be associated with the direct economic impact of the proposed Ames Reservoir including flood control, recreation, increased water supply and improved water quality. A gross method to determine 'stemming-from' and 'induced-by' indirect benefits caused by changes within the agricultural sector is developed. 'Stemming-from' benefits were estimated at approximately $80,000/year under several project designs. Parts II and III center on the social impacts of the project. Impacts evaluated include changes in highway use and construction, local tax bases, residential disruption and displacement, and future housing development adjacent to the site. Compensation payments could exceed $7 million. A survey of 390 residents indicated that one-fourth favored the project, three-tenths opposed it, and one-fourth of the respondents dis not even know that it was being contemplated. (See also W74-11587 thru W74-11596) (Schroeder-Wisconsin)
W74-11586

EVALUATION OF WATER RESOURCES DEVELOPMENT PROJECTS: THE STATE-OF-THE-ART AND EMERGING DIRECTIVES,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
D. Bromley.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2) 1973, p 2-2-1--2-2-23. 9 ref.

Descriptors: *Evaluation, *Federal project policy, *Project planning, Technology, Multiple-purpose projects, Legislation, Economic justification, Regional development, Flood plains, Welfare(Economics), Social participation, Cost-benefit theory.
Identifiers: *Ames Reservoir(IA).

The historical development of governmental guidelines covering economic evaluation of water resources projects is outlined. Included in the historical perspective are the 1936 Flood Control Act, the 1950 interagency 'Proposed Practices for Economic Analysis of River Basin Projects '(Green Book), the Bureau of Budget's Circular A-47 and Senate Document 97. Since 1969, a special task force of the Water Resources Council, reacting in part to presidential and congressional pressures, published 'Procedures for Evaluation of Water and Related Land Resources Projects' which suggested project benefits accounting be computed under four accounts--national economic development, regional development, environmental quality, and social well-being. The report has become the subject of various criticisms including the potential double accounting within the accounts, and the relatively low proposed discount rates (7%), leading, in part, to the dropping of the social well-being objective. Of equal significance in the changing federal policy with respect to project benefit analysis is a recently published compendium of 290 recommendations proposed by the Water Resources Council. To illustrate, a brief discussion of the impacts of selected Council recommendations on Iowa's proposed Ames Reservoir project's benefits is presented. (See also W74-11586) (Schroeder-Wisconsin)
W74-11587

ALTERNATIVE TAXONOMICAL CONSTRUCTS,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
J. S. Drake.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2), 1973, p 2-3-1--2-3-42.

Descriptors: *Evaluation, *Welfare(Economics), *Social participation, Decision making, Cost-benefit theory, Reservoirs, Project planning, Methodology, Value engineering, Direct costs, Indirect costs, Economic impact, Comprehensive planning, Systems analysis, Water resources development, Intangible benefits.
Identifiers: *Ames Reservoir(IA), *Project impact analysis, Skunk River Basin(IA), Environmental impact.

Growing interdisciplinary planning in public works projects requires a clearly understandable taxonomy of the potential impacts among participants. Such a taxonomy may be constructed either in reference to impact-mechanisms or impact-incidences. The first distinguishes between impacts according as to how the impact was generated and is useful in technical analysis. The second differentiates impacts according to their incidents and may be useful in participatory evaluation processes. Several paradigms for mechanism based impact classifications including the conventional impact classification found in water resources projects (primarily preoccupied with an economic perspective) and the system analysis paradigm approach which has sought greater emphasis on the identification and measuring of impacts rather than weighting them, are discussed. Elements of each paradigm are synthesized into a proposed mechanism-based impact paradigm which might be utilized in evaluating a complex project. Central to the model is a cross-classification of impact sources--production or consumption related, and an impact order which distinguishes between direct project effects, indirect effects and long-run institutional impacts. Data generated in this model is than transformed into alternative displays useful to affected interest groups who would value potential impact tradeoffs. (See also W74-11586) (Schroeder-Wisconsin)
W74-11588

PARAMETER VALUES FOR BENEFIT-COST ANALYSIS,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
D. Bromley, and J. S. Drake.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IUURR-FRS-9-A2), 1973, p 2-4-1--2-4-40, 2 fig, 2 tab, 23 ref.

Descriptors: *Evaluation, *Value engineering, *Multiple-purpose projects, *Welfare(Economics), Cost-benefit theory, Direct benefits, Wildlife, Estimating, Beneficial use, Water utilization, Flood damage, Flood protection, Water supply, Recreation, Reservoirs, Discount rates.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

The choice of values or weights generally associated with water resources project impacts and the projected direct economic impacts of Iowa's proposed multiple-purpose Ames Reservoir are critiqued. Among objectives to be accomplished by the reservoir are flood control, recreational development, additional water supplies, improved water quality, and fish and wildlife enhancement. Values for four flood control impacts--reduced property losses, crop losses, indirect production losses, and increased productivity are discussed. The Water Resources Council's interim crop prices--adjusted normalized 1964 prices, specific to the region and projected to 1970--were utilized to determine flood control benefits. The values of recreational impacts were derived utilizing the methodology proposed by Senate Document 97. Water supply and quality impacts were valued according to an alternative cost concept; changes in the stock of fish and wildlife were valued utilizing values established by the Corps of Engineers and the Bureau of Sport Fisheries and Wildlife. Technical and institutional considerations defining an appropriate discount rate are also reviewed. Three rates, 3-1/4, 5-1/2 and 7%, the latter recommended by the Water Resources Council, are evaluated. (See also W74-11586) (Schroeder-Wisconsin)
W74-11589

INDIRECT ECONOMIC EFFECTS,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
J. S. Drake.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2), 1973, p 2-5-1--2-5-31, 4 tab, 9 ref.

Descriptors: *Evaluation, *Indirect benefits, *Cost-benefit theory, Benefits, Input-output analysis, Regional economics, Flood control, Iowa, Reservoirs, Alternative planning, Estimating, Industry, Agriculture.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), 'Stemming-from' benefits, 'Induced-by' benefits, Cross-industry quotient, Location-quotient techniques.

A gross method to estimate secondary 'stemming-from' and ' induced-by' economic benefits is illustrated for a number of flood protection alternatives in Iowa's Skunk River Basin. The methodology was limited to the tracing of the immediate linkages between the agricultural sector, the farm machinery, and the food and kindred products sectors. The approach begins with national input-output data which is adjusted to approximate the regional interindustry structure utilizing the cross-industry quotient method. The quotient method is a prorating formula which adjusts national technical coefficients through a comparison of the proportion of the national output of the vending sector in the region to that of the purchasing sector. Application of the model is illustrated utilizing 1966 secondary data for the Skunk River Basin. The proposed methodology indicated that potential 'induced-by' secondary benefits were almost zero for all alternatives. 'Stemming-from' benefits caused by increases in output for the food and kindred products sector under strict assumptions were estimated at approximately $80,000/year. The degree of variation in the secondary benefits between the flood control alternatives was too slight to allow their ranking. (See also W74-11586) (Schroeder-Wisconsin)
W74-11590

PEOPLE AND THE RESERVOIR,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
J. F. Hultquist.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2) 1973, p 2-7-1--2-7-27. 1 tab, 7 ref.

Descriptors: *Reservoir construction, *Social impact, *Psychological aspects, Cost-benefit theory, River basin development, Social adjustment, Iowa, Relocation.
Identifiers: *Skunk River Basin(IA), *Ames Reservoir(IA), Relocation Assistance Act of 1970.

The many aspects arising from the planning, development, construction, and operation of a reservoir often present serious disruptions in the lives of the region's residents. Potential disruption impacts are accentuated when the rate of change in the region is accelerated. While the Relocation Assistance Act of 1970 recognized the pecuniary impacts caused by federal projects that displaced residents, non-pecuniary impacts on residents' lives, which often cannot be ameliorated, have been disregarded. Pecuniary and nonpecuniary costs of disruption come in many forms. They result partially from uncertainty as to the ultimate impact of the project. The disruptive impact of Iowa's proposed Ames Reservoir is discussed. Nearby residents felt that the security and the smoothness of their lives have been threatened through a sequence of events: first the proposed reservoir, then an unfavorable notice on the proposed reservoir, then proposed construction of an interstate highway in the region, and finally an announcement that the university was going to re-examine the unfavorable notice given the reservoir. Each of these events has had an effect on the residents. Yet, an analysis of the potential costs of the reservoir do not fully account for the disruption caused during the planning to completion interval. (See also W74-11586) (Schroeder-Wisconsin)
W74-11591

A VIEW OF THE VALLEY'S PEOPLE,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
J. F. Hultquist.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2), 1973, p 2-8-1--2-8-14. 1 fig, 3 tab.

Descriptors: *Effects, *Social impacts, *Multiple purpose projects, Reservoir construction, Alternative planning, Economic impact, Iowa, Regional redevelopment, Psychological aspects.
Identifiers: *Skunk River Basin(IA), *Ames Reservoir(IA).

Adoption of only a flood control scheme will generate differing incidences of benefits and costs among a region's residents. The incidence of people affected was surveyed for a proposed multiple-purpose project including a flood control objective located in the Skunk River Basin in Iowa. A field survey was conducted for a limited portion of the basin with 92 families, representing 361 individuals, interviewed. Under seven alternative project designs compared, three classes of people were identified--those who would be displaced, those who would not be required to move but who would lose property and/or find themselves close to a significant environmental change; and those who would experience only external effects. A summary of the alienation incidences indicates that the first alternative, utilizing two sub-impoundments in addition to a 5000-acre temporary lake, will displace 300 people, disrupt 125, and have external effects on 90 more. A second alternative consiting of 1410-acre recreational lake, without a flood pool would place 60, 250, and 158 people into the respective categories. In an intensive greenbelt plan, while requirng many landowners to transfer land to greenbelt control, few owners would be required to give up major land holdings; 330 people would be externally affected. (See also W74-11586) (Schroeder-Wisconsin)
W74-11592

DIRECT RESERVOIR IMPACT,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
J. F. Hultquist.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2), 1973, p 2-9-1--2-9-4.

Descriptors: *Reservoir sites, *Social aspects, *Highway relocation, Regional economics, Social adjustments, Social impacts, Local government, Area redevelopment, Iowa, Reservoir design, Access routes.
Identifiers: *Skunk River Basin(IA), *Ames Reservoir(IA).

While from a sociological perspective the most significant impact of Iowa's proposed Ames Reservoir will be the disruption in the lives of those displaced, other sociological impact must be evaluated. First, the reservoir's impact on existing transportation routes may be assessed at two levels: the impact on activity patterns and on road development. With respect to the former, much of the impact has been lessened by the previous construction of I-35. While the reservoir may close several east-west routes it may facilitate better access to the Interstate via E-29, especially if this road is extended directly to US-69. With respect to road development, increased recreation-related traffic as well as contemplated road closings will necessitate upgrading of the remaining river crossings. The reservoir may also affect the tax base of the townships and school districts. Each tax loss resulting from land inundation near the dam may be offset by increased property values. Boundaries for school districts will be pushed back rather than isolating portions of each, with potential busing cost reductions. Suppliers to agriculturalists may also be affected by the reduction of 4000+ acres from production. Changes in production levels make this impact difficult to assess. (See also W74-11586) (Schroeder-Wisconsin)
W74-11593

ANTICIPATED POST-CONSTRUCTION IMPACT,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
J. F. Hultquist.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2), 1973, p 2-10-i--2-10-15. 3 fig.

Descriptors: *Project post-evaluation, *Reservoir sites, *Land development, Land use, Iowa, Government finance, Post-impoundment, Sewage, Access routes, Regional development.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Coralville-Macbride Reservoirs(IA).

Construction of Iowa's proposed multi-purpose Ames Reservoir may generate dramatic land use changes in Story County. In turn, uncontrolled development could affect the reservoir's water quality, access to the reservoir, and demand for local governmental services. Each of these impacts are assessed for the Ames Reservoir utilizing comparative data from the Coralville-Macbride area, site of existing Iowa reservoirs. Discussions with county officials in the Coralville locality indicated the existence of problems with septic systems although they cause minimal water quality degradation; however, continued subdivision development may accentuate the problem. For the Ames area several factors may mitigate potential water quality problems; these include larger minimum lot sizes--25,000 sq ft--and potential development of a regional water and sewer system. Development adjacent to the Coralville Reservoir has also become a fiscal burden on local government units, road, fire, and law enforcement budgets were increased. Returns from spot developments probably will be insufficient to pay for the services required thereby increasing taxes for all property in the district. Land development may also limit access to the reservoir. Increasing the take lines and access roads to public areas may improve accessibility to the reservoir. (See also W74-11586) (Schroeder-Wisconsin)
W74-11594

THE DOLLAR COSTS,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
J. F. Hultquist.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2), 1973, p 2-11-i--2-11-40. 1 fig, 5 tab.

Descriptors: *Compensation, *Reservoir construction, *Condemnation value, Costs, Project planning, Area redevelopment, Property values, Market value, Relocation, Social impact, Social adjustment, Iowa, Reservoir sites, Estimating.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Uniform Relocation Act of 1970, Expropriation.

Four compensation principles--just compensation, fair market value, full compensation, and operationally practical compensation, utilized by the government in determining payments to be made to persons suffering loss as a result of government actions are discussed. The first two principles are based on judicial and market value, respectively. The third reflects the recognition of both the pecuniary and nonpecuniary costs incurred by individuals when 'good' must be relinquished. Operationally practical compensation refers to the degree of compensation permissible under recent interpretations and legislative acts. To illustrate the latter principle, the Corps of Engineers' application of the Uniform Relocation Act of 1970 to losses incurred by individuals affected by Iowa's proposed Ames Reservoir is discussed. Housing structures within the reservoir's proposed take line number 85, including 43 mobile homes. Total cost of land and damages including improvements and severances, contingencies, relocation assistance, acquisition expenses and land management estimates to be paid in part as compensation to displaced residents were estimated at $5,300,000, $6,342,000 and $7,315,000 respectively for low, medium, and high projections. A reduction in the scope of the project resulting in a 27% reduction in the impoundment surface area will decrease total costs of $3,923,700, $4,711,200 and $5,425,250. (See also W74-11586) (Schroeder-Wisconsin)
W74-11595

A SUMMARY OF A STUDY OF CITIZEN VIEWS AND ACTIONS ON THE PROPOSED AMES RESERVOIR,
Iowa State Univ., Ames. Dept. of Sociology.
G. Bultena, D. Rogers, and V. Webb.
In: Ames Reservoir Environmental Study. Appendix 2. Economic and Social Impact, Iowa State Univ., Ames, Report ISWRRI-60-A2 (IURR-FRS-9-A2), 1973, p 2-13-1--2-13-9.

Descriptors: *Social participation, *Attitudes, *Reservoirs, *Reservoir construction, Decision making, Social values, Iowa, Motivation.
Identifiers: *Ames Reservoir(IA), *Skunk River Valley(IA).

The attitudes and behavior of individuals living within the purview of Iowa's proposed Ames Reservoir were examined to determine whether the proposed project is in the 'public interest.' Interviews were conducted with 390 people, selected

by a linked process of area-probability and random sampling. Areas researched were on current and post-project public response, the relationship between citizens' characteristics and attitudes, and the level of public awareness of the current state of the project, and their evaluation of its potential benefits and costs. Approximately one-fourth of the respondents favored the project and 30% were opposed. Characteristics of respondents opposed had little impact on attitudes. Positive support for the reservoir was related to positive attitudes to construction of other reservoirs, the Corps of Engineers, and a developmental orientation to the environment. Flood control and recreation were perceived as the major benefits while opponents claimed too much farmland would be flooded, it would benefit too few people, and would reduce the valley's attractiveness. Only a small proportion, 7%, of the respondents had engaged in activities designed to influence governmental decisions. A 4:1 ratio of people opposing to those approving the project were active in efforts to influence decision making. (See also W74-11586) (Schroeder-Wisconsin)
W74-11596

AMES RESERVOIR ENVIRONMENTAL STUDY. APPENDIX 3. OUTDOOR RECREATION AND OPEN SPACE.
Iowa State Univ., Ames.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 402, $15.00 in paper copy, $2.25 in microfiche. Iowa State Water Resources Research Institute Report ISWRRI-60-A3, 1973. 181 p, 13 fig, 74 tab, 49 ref. OWRT A-999-IA(8c).

Descriptors: *Alternative planning, *Recreation, *Iowa, *Reservoirs, Cost-benefit analysis, Project planning, Financing, Multiple-purpose projects, Benefits, Recreation demand, Attitudes, Land use, Costs, Evaluation, Administrative agencies, Future planning(Projected), Environmental effects.
Identifiers: *Ames Reservoir(IA), *Skunk River Valley(IA), Story County(IA), Greenbelt development.

This appendix contains the results of studies of the problems encountered concerning outdoor recreation and open space use and their related environmental impacts. Measurement of current recreational use of the Skunk River Valley near the proposed Iowa's Ames Reservoir site using representative surveys and sampling techniques indicated that the most popular activities were golfing, fishing, nature studies, and picnicking. Activity days for all users totaled 35,846. Changes in recreation demand are estimated for several development plans including the proposed reservoir, a minimum conservation pool, and a greenbelt corridor. Benefits of each alternative are computed utilizing user-day values suggested by the Water Resources Council and juxtaposed to their land, capital, operating, maintenance, and replacement costs. Recreation benefit-cost ratios computed yield 0.794 for the proposed reservoir, 0.964 for intensive greenbelt development, and 8.460 for the status quo. A companion study for recreational patterns on an established reservoir--Coralville-Lake Macbride--indicates those elements which attract various user groups to a site. Impacts of the proposed reservoir on the policies and financial resources of the Story County Conservation Board, who is responsible for recreational sites, are also discussed. (See W74-11598 thru W74-11604) (Schroeder-Wisconsin)
W74-11597

CURRENT RECREATION USE,
Iowa State Univ., Ames. Dept. of Forestry.
G. E. Campbell, and J. O. Dawson.
In: Ames Reservoir Environmental Study. Appendix 3. Outdoor Recreation and Open Space, Iowa State Univ. Report ISWRRI-60-A3, 1973, p 3-1-ii--3-1-26. 5 fig, 12 tab.

Descriptors: *Recreation, *Reservoir sites, *Recreation demand, Golf courses, Parks, Sport fishing, Recreation facilities, Reservoirs, Iowa, Sampling, Use rates, Attitudes.
Identifiers: *Ames Reservoir(IA), *Skunk River Valley(IA).

Current outdoor recreation activities and development opportunities are assessed for Iowa's proposed Ames Reservoir on the Skunk River in Story County, between Ames and Story City. The area has sustained a varied wildlife population including waterfowl, upland, small and large game, plus several fish species. The surrounding area is primarily in intensive farming. Several public access and recreational areas are available on or near the proposed reservoir site including a number of parks and a golf course. Outdoor recreation opportunities presently available include fishing, camping, hiking, canoeing, golfing, and hunting. Estimates of current use, obtained through unequal probability sampling which accounted for a number of factors including total man-hours of recreation by activity, average length of stay by activity, and total activity days by activity, indicate that the most popular activities were golfing, fishing, nature study, and picnicking, yielding total activity days of 13,082, 6,570, 5,353, and 3,634, respectively. Activity days for all activities totaled 35,846. Low participation in other recreation forms may reflect limited facilities rather than demand. The qualitative impact on future demand and use of the recreational sites at the proposed reservoir is briefly discussed. (See also W74-11597) (Schroeder-Wisconsin)
W74-11598

RECREATION USE PROJECTIONS FOR THE PROPOSED AMES RESERVOIR AND ALTERNATIVES,
Iowa State Univ., Ames. Dept. of Forestry.
G. E. Campbell, and J. O. Dawson.
In: Ames Reservoir Environmental Study. Appendix 3. Outdoor Recreation and Open Space, Iowa State Univ. Report ISWRRI-60-A3, 1973, p 3-2-i--3-2-40. 5 fig, 16 tab, 12 ref.

Descriptors: *Forecasting, *Recreation, *Reservoirs, Iowa, Recreation demand, Alternative planning, Recreation facilities, Use rates, Model studies.
Identifiers: *Ames Reservoir(IA), *Skunk River Valley(IA).

The impact of Iowa's proposed Ames Reservoir and several alternative projects on outdoor recreation and open space use are explored. Included in the alternatives considered were (1) the Ames Reservoir with two subimpoundments, (2) a minimum conservation pool for recreation without water quality, flood control, or storage, (3) a tributary recreational lake development and (4) moderate to intensive greenbelt development. Predictive equations utilized projected user demand for each alternative on assumed use as related to population, distance from site to population centers, and supply and demand characteristics of recreation facilities for each site. Gravity models for each and all combined activities were prepared for alternative 1 - 3 incorporating distance from all population centers to all recreation sites and relative supply at each site in terms of average available land and/or water. Modeling results, assuming medium population growth projections, indicated total use in 1970 and 1980 of 277,343 and 306,323 and 234,176 and 258,646, for example, for the first two alternatives. Projected use demand was also estimated for the proposed reservoir configuration assuming only minimum facilities and no federal cost-sharing. The impact of mud flats, flooding, agricultural land, and public access to the recreational sites on user demands and alternative project demands are also discussed. (See also W74-11597) (Schroeder-Wisconsin)
W74-11599

COSTS OF RECREATION BENEFITS,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
W. G. Beardsley.
In: Ames Reservoir Environmental Study. Appendix 3. Outdoor Recreation and Open Space, Iowa State Univ., Report ISWRRI-60-A3, 1973, p 3-3-i--3-3-16. 6 tab, 5 ref.

Descriptors: *Costs, *Recreation, *Reservoir sites, Iowa, Access routes, Recreation facilities, Beaches, Camping, Boat-launching ramps, Administrative costs, Operating costs, Maintenance costs, Capital costs.
Identifiers: *Skunk River Valley(IA), *Ames Reservoir(IA).

Cost estimates of providing recreation should include a number of items including the cost of additional land, access roads, recreational facilities, annual operating, maintenance and replacement, as well as the loss of current and future demand at alternative sites. To illustrate the relative magnitude of each of these elements six alternative recreational plans are costed for a central Iowa site including unit costs, item quantities and acreage. For the first alternative the optimal development of the Ames Reservoir with two subimpoundments, total construction, land, and total cost were $1,704,400, $415,000 and $6,227,100, respectively. A second plan consisting of a minimum conservation pool without subimpoundments resulted in $1,366,520, $415,00 and $5,096,370. A tributary lake produced respective costs of $659,600, $235,00 and $2,442,200. Green belt development generated costs of $70,900, $39,600 and $276,500. Even without development, annual operation, maintenance, and replacement costs for existing regional recreational facilities will result in over $27,600 in costs. (See also W74-11597) (Schroeder-Wisconsin)
W74-11600

VALUE OF RECREATION BENEFITS,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
W. G. Beardsley.
In: Ames Research Environmental Study. Appendix 3. Outdoor Recreation and Open Space, Iowa State Univ. Report ISWRRI-60-A3, 1973, p 3-4-1--3-4-17. 7 tab, 11 ref.

Descriptors: *Water resources development, *Recreation, *Value, Reservoirs, Pricing, Value engineering, Multiple-purpose projects, Streams, Iowa, Alternative planning, Social values, Evaluation.
Identifiers: *Skunk River Valley(IA), *Ames Reservoir(IA), Story County(IA).

The determination of recreational values often plays a significant role in the analysis of benefits and costs of multipurpose water development projects. Senate Document 97 directed federal agencies to value recreational benefits in terms of the direct benefit perceived by users rather than through the cost of development or income generated by recreationists' expenditures. Suggested values provided by the Document for warm water fishing, picnicking, nature studies, and canoeing in placid waters generate unit-day values ranging from $0.50 - $1.50. Recreational opportunitity-limited days involving activities of low use intensity which may involve large personal expenditures include cold water fishing, wilderness pack trips, or white water boating. Unit-day values for this group range from $2.00 - $6.00. A proposed revision of these figures has been suggested, raising unit-day values to $0.75 - $2.25 and $3.00 - $9.00. Use of these values in constructing benefits and costs are illustrated for a number of recreational project designs in the Skunk River Valley, Iowa. Assignment of values depended on water quality levels, expected debris, presence of mud flats, saving of forested areas, as well as the number of recreational experiences provided. Recreational losses from construction of the

proposed alternatives are also measured. (See also W74-11597) (Schroeder-Wisconsin)
W74-11601

RECREATION USE AND USERS OF THE CORALVILLE-MACBRIDE AREA: A COMPARATIVE CASE STUDY,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
J. S. Gardner, and N. B. Hultquist.
In: Ames Reservoir Environmental Study. Appendix 3. Outdoor Recreation and Open Space, Iowa State Univ., Report ISWRRI-60-A3, 1973, p 3-5-i--3-5-88. 2 fig, 30 tab, 21 ref.

Descriptors: *Water resources development, *Recreation, *Management, Recreation facilities, Attitudes, Recreation demand, Water sports, Reservoirs, Social aspects.
Identifiers: *Coralville-Macbride area(IA), *Skunk River Valley(IA), *Ames Reservoir(IA).

Recreationists' perceptions of the biophysical environment, facilities and management, accessibility and users' socioeconomic characteristics were surveyed for the Coralville Reservoir-Macbride Lake complex, one of Iowa's major recreational areas. Data for the survey was collected through 223 interviews conducted at three access points on the reservoir and two on Macbride Lake during 1972. Two formats were utilized, one with a set of statements and recreational activities which respondents ranked on a continuum of agree-disagree and like-dislike and the other providing for a better ranking of preferences of specific groups, e.g., fishermen. Respondents were also presented four pairs of photographs depicting varying combinations of vegetation, topography, and facilities and asked to make preferential choices. The majority of users within 50 miles of the complex, use it primarily for water related activities, camping, or relaxation. Access, facilities, and water resources are among the primary attractants while certain facilities and management were listed as unattractive. Facilities and improvements preferred by various user groups were also identified. This information could influence future development plans for this complex and other proposed projects. Results of a similar study of the proposed Ames Reservoir's potential uses obtained through a mail return survey are also presented and compared. (See also W74-11597) (Schroeder-Wisconsin)
W74-11602

IMPACT OF PROPOSED AMES RESERVOIR ON STORY COUNTY CONSERVATION BOARD PROGRAMS,
Story County Conservation Board, Iowa.
R. Pinneke.
In: Ames Reservoir Environmental Study. Appendix 3. Outdoor Recreation and Open Space, Iowa State Univ., Report ISWRRI-60-A3, 1973, p 3-6-1--3-6-4.

Descriptors: *Administrative agencies, *Recreation, *Reservoir construction, Financing, Budgeting, Comprehensive planning, Iowa, Local governments, Recreation facilities.
Identifiers: *Ames Reservoir(IA), *Story County(IA), Story County Conservation Board.

Construction of multipurpose water development projects often places additional strain on local agencies' budgets and programs. A number of such impacts, the potential result of the proposed Ames Reservoir in Iowa, will affect the Story County Conservation Board. Duties of this Board include the provision and maintenance of recreation and conservation areas as well as generation and promotion of the county's comprehensive recreation plan. The major impact of the proposed reservoir will be a dramatic change in the physical environment available for recreation and conservation purposes. A number of such sites will be inundated, and access to some may be curtailed. While the proposed reservoir is expected to satisfy basic recreation needs, it is apparent that the projected recreation demand exceeds the supply, forcing the Board to consider provisions of new facilities as well as long term financial entanglement to meet its cost-sharing responsibilities to satisfy financial requirements. The reservoir's additional facilities may run counter to the Board's earlier comprehensive plan and limited fiscal resources may force it to modify both its objectives and development priorities. (See also W74-11597) (Schroeder-Wisconsin)
W74-11603

ALTERNATIVE 4A: INTENSIVE GREENBELT DEVELOPMENT AS AN ADDITIONAL CONSIDERATION,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
H. H. Webster, M. D. Dougal, W. G. Beardsley, J. C. Gordon, and G. E. Campbell.
In: Ames Reservoir Environmental Study. Appendix 3. Outdoor Recreation and Open Space, Iowa State Univ. Report ISWRRI-60-A3, 1973, p 3-7-i--3-7-10. 1 fig, 3 tab.

Descriptors: *Cost-benefit analysis, *Recreation, *Alternative planning, Reservoir construction, Land use, Zoning, Benefits, Costs.
Identifiers: *Ames Reservoir(IA), *Skunk River Valley(IA), Greenbelt development.

An alternative to reservoir-based recreation is maintenance of a greenbelt corridor which preserves the area in its natural state. A greenbelt design suggested as an alternative to Iowa's proposed Ames Reservoir assumes that the environment could be maintained through careful land-use planning, zoning, and private ownership. Only 72 acres would be purchased to provide access points and intensive-use recreational sites. Experience in Story County, site of the proposed reservoir, indicates that future development and consequent destruction of the natural setting may not be easily forestalled. It follows that if a scenic greenbelt corridor is desirable then a greater measure of public control or ownership in the valley must be assumed. An alternative greenbelt development plan reviewed suggests acquisition of a 100-foot strip on both sides of the Skunk River and of significant segments of bottomland forests and upland forests and pastures. Additional acreage can be controlled through leases and flood plain zoning. Six intensive recreation sites providing hiking, nature studies, camping and water-related activities are also proposed. Total cost of the alternative is $4,410,260 with a benefit-cost ratio of 0.964 contrasted to a benefit-cost ratio of 0.794 for the proposed reservoir. (See also W74-11597) (Schroeder-Wisconsin)
W74-11604

AMES RESERVOIR ENVIRONMENTAL STUDY. APPENDIX 4. PHYSICAL RELATIONSHIPS WITH THE AGRICULTURAL SECTOR.
Iowa State Water Resources Research Inst., Ames.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 403, $16.00 in paper copy, $2.25 in microfiche. Report ISWRRI-60-A4, 1973. 262 p, 20 fig, 48 tab, 120 ref. OWRT A-999-IA(8d).

Descriptors: *Multipurpose projects, *Reservoir sites, *Agronomy, *Cost-benefit analysis, Reservoirs, Flood control, Tile drainage, Terracing, Flood damage, Flood forecasting, Crop production, Farm prices, Flood data, Mathematical studies, Sediment load, Reservoir silting, Sediment transport, Sediment distribution, Sediment yield, Iowa, Farm wastes, Waste disposal, Cost analysis, Farm management, Pesticides, Herbicides, Insecticides, Fertilizers, Nitrates, Phosphates, Land use.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

The physical, social, and economic milieu surrounding Iowa's proposed Ames Reservoir is examined in connection with the effects on the watershed's environment. Several agricultural production decisions including fertilizer application methods and levels, pesticide and herbicide use, and animal waste management techniques are discussed. The watershed is generally level and highly cropped--three-quarters presently in corn and soybeans. A 1972 sampling indicated that tile effluent and subsurface seepage was a primary source of nitrate-nitrogen in the Skunk River. The potential impact of a number of chemicals including chlorinated hydrocarbon, organophosphorus, and carbomate insecticides and herbicides on the environment are compared. The watershed contains a number of livestock operations; surveys of alternative animal waste disposal methods indicate that the traditional spreading method remains both economically and environmentally most sound. Present land use techniques in the basin have lead to an estimated 300 ton/sq mi/year total long term sediment production rate. Methods to distribute this sediment within the region are suggested. Benefit analyses from the proposed reservoir depend on the estimated flood damage, price, and yield data. A number of flood frequency distributions are reviewed and the sensitivity of the Corps of Engineers' proposed benefit/cost ratio to changes in these factors is considered. (See W74-11606 thru W74-11613) (Schroeder-Wisconsin)
W74-11605

AGRICULTURAL LAND USE PATTERNS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
E. R. Duncan, W. D. Shrader, and D. B. Palmer.
In: Ames Reservoir Environmental Study. Appendix 4, Physical Relationships With the Agricultural Sector, Iowa State Univ. Report ISWRRI-60-A4, 1973, p 4-1-i--4-1-23. 1 fig, 10 tab, 3 ref.

Descriptors: *Agricultural watersheds, *Reservoir sites, *Land use, Farm management, Crop production, Iowa, Crops, Preimpoundment, Flooding.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

The impact of the proposed Iowa Ames Reservoir on agricultural land use patterns is presented. The reservoir site is located on the Skunk River and contains some of the highest quality soils in the United States. Cropped area varies from 70-80% within the watershed. Within the reservoir site the percent of cropped land is low, ranging from 30% near the reservoir to about 60% near the take line. Historic crop yields vary from 85, 32, and 57 bushels/acre for corn, soybeans, and oats and 2.0 ton/acre for hay in the conservation pool to 97,32, 60, and 2.8 for the flood pool to the take line, respectively. Historical data presented covering water depth, and days of inundation and the resultant percentage yield reduction by crop indicates that it may be feasible to crop some land beneath the take line because of the low flooding frequency. Reed Canary grass was cited as feasible to convert the area to grazing above the conservation pool because of its capacity to tolerate extended periods of inundation. Cropping practices are predicted to remain unchanged as a result of the reservoir with large portions of the watershed to remain in cropland. (See also W74-11605) (Schroeder-Wisconsin)
W74-11606

WATER QUALITY IMPLICATIONS OF LIVESTOCK PRODUCTION,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
T. E. Hazen, D. H. Vanderholm, and J. R. Miner.
In: Ames Reservoir Environmental Study. Appendix 4. Physical Relationship With the Agricultural Sector, Iowa State Univ. Report ISWRRI-60-A4, 1973, p4-4-i--4-4-32. 13 tab, 13 ref.

Descriptors: *Waste disposal, *Water quality, *Farm wastes, Water pollution control, Waste treatment, Economics, Farm management, Cost analysis, Capital costs, Operating costs, Iowa, Feed lots, Runoff, Reservoirs.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Animal wastes are major water pollution sources however the impact of such wastes can be controlled through alternative management techniques. A survey of the literature indicates that the application of wastes by spreaders, manure tank wagons, and irrigation can reduce to less than 1% the portion of excreted pollutants escaping into the environment. Treatment methods, including oxidation ditches, anaerobic and aerated lagoons, are also considered although none yield acceptable effluent for surface water courses. The impacts of animal waste and potential management policies on the water quality of Iowa's Ames Reservoir basin is evaluated. Though livestock production in the region is not intensive--no cattle or swine operations exceed 1000 head--it is still of major importance. Over 2 million pounds of manure are produced daily most of which is applied to cropland. Management practices including prevention of direct waste discharges, locating feed lot boundaries away from streams, and fencing animals where they might disturb banks are recommended. Runoff control costs vary from $1.00 to $10.00 per head according to feed lot size. Manure management, loss of grazing areas adjacent to water, and aesthetic conservation are also costs to be evaluated. (See also W74-11605) (Schroeder-Wisconsin)
W74-11609

RESERVOIR SEDIMENTATION,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
B. Nudd, and C. E. Beer.
In: Ames Reservoir Environmental Study. Appendix 4. Physical Relationship with the Agricultural Sector, Iowa State Univ. Report ISWRRI-60-A4, 1973, p 4-5-i--4-5-35. 6 fig, 7 tab, 8 ref.

Descriptors: *Reservoirs, *Sediment yield, *Reservoir silting, *Mathematical models, Sediment load, Sediment discharge, Sediment distribution, Sediment transport, Watershed management, Iowa, Sedimentation rates, Deposition(Sediments).
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Area correlation.

Estimating techniques to determine the sediment yield to Iowa's proposed Ames Reservoir, utilizing data from four of that state's watersheds having similar physical characteristics, are presented. Area correlation results in total long term sediment production rate estimates of 300 tons/sq mi/year composed of the outcome of an extension of the fitted straight line from the observed watersheds and sediment values 2-tuple plus the addition of 10% of the suspended load to allow for bed load. Sediment production potentials of areas within the region are also estimated. These areas consist of watershed segments having similar gross erosion rates, amount of soil detached, and delivery ratios to allow estimates of the percentage each contributes to the sediment load. For the Ames Reservoir basin, divided into four subdivisions, the universal soil loss equation and data from a comparable watershed, compilations suggest that at least three-quarters of the total sediment load is produced by the valley area, a small proportion of the 314 sq mi watershed. Earlier reservoir storage loss estimates of 8400 acre-feet--24% of the combined sediment and conservation pools are confirmed. Improved conservation practices could reduce the reservoir storage loss by one-half. (See also W74-11605) (Schroeder-Wisconsin)
W74-11610

WATER CONTROL ON AGRICULTURAL LAND,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
D. B. Palmer.
In: Ames Reservoir Environmental Study. Appendix 4. Physical Relationship with the Agricultural Sector, Iowa State Univ. Report ISWRRI-60-A4, 1973, p 4-7-i--4-7-24. 5 fig, 4 tab, 5 ref.

Descriptors: *Flood control, *Reservoirs, *Economic justification, *Agriculture, Cost-benefit analysis, Cost-benefit theory, Benefits, Iowa, Flood damage, Flood control, Flood forecasting, Flood frequency, Flood protection, Frequency analysis, Farm prices, Flood plains.
Identifiers: *Skunk River Basin(IA), *Ames Reservoir(IA), Log-Pearson method.

A major component of the economic justification for Iowa's proposed Ames Reservoir was the reduction of flood damages. Cost-benefit estimates prepared by the Corps of Engineers are analyzed. Four components which influence this determination are considered: project flood distribution, product prices, production costs, and crop yield. To construct the first, a log-Pearson Type III distribution, recommendated by the Water Resources Council was utilized to develop damage probability curves based on the regional multiple regression analysis approach of the Iowa Natural Resources Council. Utilization of this distributive form resulted in a reduction of benefits from $681,000 to $354,000. Flood control benefits are also shown sensitive to prices, costs, and yields. An alternative set of such values considered reasonable could result in a 7% increase in the original values estimated by the Corps. Two alternative estimates of flood damages were also explored; one published by the U.S. Weather Bureau yielded an average annual loss of $333,000 for a 38 year period. Changes in land values within the region, however, did not clearly reflect income losses as a result of flooding. Flood plain management techniques are also examined as alternatives to the proposed reservoir. (See also W74-11605) (Schroeder-Wisconsin)
W74-11612

ALTERNATIVE LAND AND WATER MANAGEMENT PROGRAMS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
D. B. Palmer.
In: Ames Reservoir Environmental Study. Appendix 4. Physical Relationship with the Agricultural Sector, Iowa State Univ. Report ISWRRI-60-A4, p 4-8-i--4-8-13. 1 fig, 2 tab, 3 ref.

Descriptors: *Alternative planning, *Reservoirs, *Project planning, *Watershed management, Drainage programs, Tile drainage, Watershed Protect and Flood Prevention Act, Sediment control, Iowa, Terracing, Flood control, Small watersheds.
Identifiers: *Ames reservoir(IA), *Skunk River Basin(IA).

The need for alternative reservoir designs is a function of a number of factors including the existing agricultural practices and activities. For the proposed Ames Reservoir implementation of Public Law 566 small watershed projects could vary the optimum reservoir configuration. Such projects could provide for improved drainage, flood control, wildlife improvement, recreation, water supply, and erosion control, elements often cited to justify the Ames Reservoir in the Skunk River Basin, Iowa. Ten subwatersheds identified in the basin could be beneficiaries of P.L. 566 projects with those above the reservoir potentially benefiting from improved drainage and small flood damage relief and those below obtaining drainage benefits. Terracing decisions could also result in flood control benefits altering the need for the reservoir. Terracing along the Floyd River in Iowa could lead to a 31% reduction in peak runoff for a 2.86 inch runoff and 37% terracing. Tile outlet terracing by farmers also promotes flood control, sediment control, as well as control of nutrient and pesticide runoff. Some of these benefits may be adversely affected by the proposed reservoir construction through inundations caused by the reservoir's fluctuating water levels requiring certain modifications in existing tile systems located between 950-976 feet. (See also W74-11605) (Schroeder-Wisconsin)
W74-11613

AMES RESERVOIR ENVIRONMENTAL STUDY. APPENDIX 5. PHYSICAL RELATIONSHIP WITH THE URBAN SECTOR.
Iowa State Water Resources Research Inst. Ames.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 404, $33.50 in paper copy, $2.25 in microfiche. Report ISWRRI-60-A5, 1973. 552 p, 114 fig, 145 tab, 182 ref. OWRT A-999-IA (8e).

Descriptors: *Water resources development, *Multiple-purpose projects, *Reservoir design, Human population, Projections, Iowa, Flood control, Water management(Applied), Urban hydrology, Urban drainage, Watershed management, Flood plain zoning, Non-structural alternatives, Regional development, Regional analysis, Groundwater resources, Alternative planning, Waste water, treatment, Flood damage, Water quality standards, Forecasting, Cost analysis, Economic justification, Simulation analysis, Water level fluctuation, Chemical analysis, Municipal water, Reservoir design, Water requirements, Benefits, Sewage districts, Public utility districts, Water supply, Mathematical models.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Ames(IA), Story City(IA), Story County(IA).

The interrelationships between urban growth, population growth, alternative water sources and urban needs, water pollution and waste treatment requirements, urban flood damage, and existing flood plain management techniques, on the optimal design of Iowa's proposed Ames Reservoir are evaluated. Benefits arising from the water supply function of the reservoir depend in part on the first five foregoing elements. By generating population projections for 1970-2020 future per capita water demands are projected for Ames. Under median assumptions of birth and economic growth rates, existing Ames water sources must be augmented by the year 2000. An evaluation of potential groundwater sources is also made. Annual water supply benefits equal to the cost differentials of providing equal quality water from the reservoir or groundwater sources varied from $1430-$2170. Regional management techniques to develop a regional water supply and treatment provision within the basin are also discussed. The proposed reservoir will also affect waste water treatment. A mathematical simulation of stream water quality at Ames is presented and the impact of waste water quality requirements are assessed. Urban flood damages of $29,600 will also be eliminated by the proposed reservoir. Flood plain management as an alternative approach is discussed. (See W74-11615 thru W74-11622) (Schroeder-Wisconsin)
W74-11614

POPULATION PROJECTIONS FOR AMES AND THE RESERVOIR AREA OF INFLUENCE,
Iowa State Univ., Ames. Dept. of Civil Engineering.
R. L. Rossmiller, and M. D. Dougal.
In: Ames Reservoir Environmental Study. Appendix 5. Physical Relationship with the Urban Sector, Iowa State Univ. Report ISWRRI-60-A5, 1973, p 5-1-i--5-1-90. 32 fig, 53 tab, 20 ref.

Descriptors: *Human population, *Water resources development, *Iowa, *Projections, Multipurpose reservoirs.
Identifiers: *Ames Reservoir(IA), Story County(IA), Ames(IA).

Population projections for Iowa and the proposed Ames Reservoir area are discussed. Over the 1920-1970 period, Iowa's population only grew by 420,000, a partial result of high emigration. Projections taken from a compendium of earlier state and federal studies have estimated population growth ranging from 0.50% by 2020, assuming differing fertility, death, and migration rates. Population projections are made for the period of 1970-2020 in five year increments for the area surrounding the reservoir site--Ames and Story County--by utilizing the component method. Factors included in the method are Iowa State University population at Ames, non-student population of Ames, the Story County rural areas, and urban areas of Story County. Sensitivity of the projections to alternative birth and economic conditions is also examined. Population projections for ISU depend on birth rates, state population projections, and educational trends, and for the remainder of Ames, on future industrial and commercial growth. Projections for the remainder of Story County are made utilizing (1) graphical extrapolation of rural and urban categories and (2) through birth, death, and migration rates of the entire county. Population projections for a four and nine county area surrounding the reservoir and area projections for the 2020-2070 period were also made. (See also W74-11614) (Schroeder-Wisconsin)
W74-11615

EVALUATION OF THE GROUNDWATER RESOURCE IN THE UPPER SKUNK RIVER BASIN,
Iowa State Univ., Ames. Dept. of Civil Engineering.
M. D. Dougal, L. V. A. Sendlein, and J. F. Wiegand.
In: Ames Reservoir Environmental Study. Appendix 5. Physical Relationship with the Urban Sector, Iowa State Univ. Report ISWRRI-60-A5, 1973, p 5-2-i--5-2-84. 39 fig, 8 tab, 18 ref.

Descriptors: *Groundwater resources, *Reservoir construction, Dewatering, Seepage, Aquifer characteristics, Aquifer systems, Computer models, Groundwater availability, Analysis, Iowa, Reservoir releases, Water supply.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Releases from the proposed Iowa Ames Reservoir, as they may affect the groundwater regime, are discussed in connection with the groundwater at the reservoir site, evaluation of the safe yield and maximum sustained yield of the Ames aquifer, and the general response of groundwater levels in the flood plain downstream of Ames to rises in stream stage. The response of aquifers at several locations to pumping or to stream rises occurring from flood stages was examined. A digital computer model of the well fields at Ames was developed to assist in determining the yield of the combined City-Iowa State University system. Studies were used to determine the conditions under which the reservoir might be most advantageous and alternatives which may be necessary if the reservoir is not built. The seepage potential was evaluated since the piezometric gradient would be increased measurably once the reservoir operated at either conservation pool or flood pool elevations. At proposed conservation pool elevations of 940 or 950 ft little effect on the artesian piezometric surfaces would be expected; at the maximum flood pool elevation of 976 ft (or 965 ft) more downstream portions of the confined aquifers will have hydraulic loading equivalent to a 20-30 ft depth of water. (See also W74-11614) (Auen-Wisconsin)
W74-11616

FUTURE WATER SUPPLY REQUIREMENTS AND ALTERNATIVE SOURCES OF SUPPLY AT AMES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
R. L. Rossmiller, J. F. Wiegand, M. D. Dougal, and J. L. Cleasby.
In: Ames Reservoir Environmental Study. Appendix 5. Physical Relationship with the Urban Sector, Iowa State Univ. Report ISWRRI-60-A5, 1973, p 5-3-i--5-3-39. 4 fig, 14 tab, 16 ref.

Descriptors: *Projections, *Reservoir construction, *Water supply, *Water requirements, Iowa, Water utilization, Beneficial use, Groundwater, Reservoir storage, Alternative planning, Costs, Cost comparisons, Water demand.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Ames (IA).

To evaluate benefits from water storage in Iowa's proposed Ames Reservoir estimates of future water demand for the City of Ames, the University, and commercial and industrial concerns, potential population growth in the region, and capacities and cost of alternative sources of water supply including the reservoir's are limned. Future water demands were estimated by projecting per capita demand rates, population growth, economic growth, etc. Three levels of projected use rates and population growth rates indicate no additional water sources will be required during 1970-2020 under low estimates. Medium estimates show that other sources than the existing well fields will be required by 2000. Augmentation sources considered include deepwater wells (poor quality) and the proposed reservoir used either to recharge or sustain the shallow well system at its present drawdown levels or to provide water of similar (high quality) to shallow wells. Under medium projections, the total annual benefits--determined from the cost differential to provide equivalent high quality water, or reservoir water supplies--equaled $1430-$2170 (assuming varying discount rates). Less than 500-acre feet of storage and release levels of 0.2-0.5 cfs were required to meet demand. Under high projections values of $6080-$9110; 1500-2000 acre-feet, and 2-3 cfs were estimated. (See also W74-11614) (Schroeder-Wisconsin)
W74-11617

STREAM WATER QUALITY AS IT IS INFLUENCED BY URBAN COMMUNITIES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
E. R. Baumann, and M. D. Dougal.
In: Ames Reservoir Environmental Study. Appendix 5. Physical Relationship with the Urban Sector, Iowa State Univ. Report ISWRRI-60-A5, 1973, p 5-4-i--5-4-91. 22 fig, 15 tab, 17 ref.

Descriptors: *Reservoirs, *Water quality, *Urban hydrology, Water quality standards, Waste water(Pollution), Waste water treatment, Iowa, Municipal wastes, Rivers, Streams, Water pollution sources, Low-flow augmentation, Upstream, Downstream.
Identifiers: *Ames Reservoir(IA), *Skunk River(IA), Ames(IA), Story City(IA).

The impact of urban waste water treatment on the water quality of the Skunk River and Iowa's proposed Ames Reservoir, located on the Skunk, is assessed. Seven communities above the proposed dam were found to discharge effluents into the river. Four presently utilize waste stabilization lagoons or ponds, which, if properly designed and operated, adequately meet existing state water quality standards. Two others still utilize septic tanks but their small size precludes significant impact on stream quality. The seventh, Story City, utilizes an Imhoff trickling filter plant which has on a number of occasions discharged improperly treated wastes into the river. Under existing quality standards the cities' waste treatment facilities must be upgraded to meet the 85-90% BOD and suspended solids removal requirement. Future plans to raise water quality levels to protect the aquatic community between Story City and Ames will require improved treatment. Reservoir construction would require improved coliform reduction. For Ames, downstream treatment facilities must be improved to meet quality standards and growth requirements. While the proposed reservoir may provide low flow augmentation, higher quality standards may require greater treatment expenditures in the future. (See also W74-11614) (Schroeder-Wisconsin)
W74-11618

MATHEMATICAL SIMULATION OF STREAM WATER QUALITY AT AMES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W74-11619

WASTE WATER TREATMENT NEEDS FOR AMES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
J. C. Young.
In: Ames Reservoir Environmental Study. Appendix 5. Physical Relationship with the Urban Sector, Iowa State Univ. Report ISWRRI-60-A5, 1973, p 5-6-i--5-6-45. 7 fig, 27 tab, 3 ref.

Descriptors: *Projections, *Treatment facilities, *Waste water(Pollution), Cost analysis, Water quality standards, Forecasting, Reservoir construction, Water utilization, Infiltration, Suspended solids, Design.
Identifiers: *Ames Reservoir(IA), *Ames(IA), Skunk River(IA), Waste water flow.

Changes in state and federal water quality requirements and population growth have placed increasing burdens on Ames, Iowa existing trickling filter waste water treatment facilities. Future population projections for Ames are subject to enrollment levels at Iowa State University and influx of new industry into the area. Annexation may also increase sewer service demand. To evaluate increased water demand three population projections--low, medium, and high--are utilized. Waste water flow was shown to represent 72% of the total per capita water usage in dry years. In wet years an additional increment of 25 gallons per capita per day must be added to allow for infiltration. Principal industries contributing to Ames waste water flows are typically low-volume water users, whose combined flowage is not expected to exceed 10%. Variations in waste water flow also need to be considered as maximum flows occur in the spring when runoff and infiltration are greatest. Organic loads received by the present Ames treatment plant are also erratic. A comparison of costs to meet waste water projections, assuming a 7% interest rate and a 25-year design period, indicates that the trickling filter remains the cheapest treatment method of a number considered. (See also W74-11614) (Schroeder-Wisconsin)
W74-11620

REGIONAL WATER SUPPLY AND WATER QUALITY CONCEPTS AND MANAGEMENT ALTERNATIVES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
D. C. Rovang, D. W. Hubly, and M. D. Dougal.
In: Ames Reservoir Environmental Study. Appendix 5. Physical Relationship with the Urban Sector, Iowa State Univ., Report ISWRRI-60-A5, 1973, p 5-7-i--5-7-51. 6 fig, 15 tab, 22 ref.

Descriptors: *Regions, *Regional analysis, *Water supply, *Waste water treatment, *Management, Sewage districts, Alternative planning, Projections, River basins, Iowa, Water sources.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Regional management techniques are discussed in three studies of water supply and waste water treatment in the upper Skunk River Basin, site of

Iowa's proposed Ames Reservoir. A brief review of the water supply and projected water demand is generated. No county-wide water supply system exists in the upper basin, each municipality drawing from surficial, the upper, and lower bedrock aquifers. A proposed regional water supply plan, utilizing local communities (e.g., Ames) having good quality groundwater supplies as purveyors for the surrounding agricultural region, is examined. Waste water management factors affecting municipalities in an 800 sq mi portion of the basin were collected through interviews with local and state officials. Performance, operation, and financing data collected from 15 communities in the study area indicate potential economies of scale could result from a regional approach to waste water treatment. A third study investigated potential waste water treatment considerations for the area surrounding the Ames Reservoir. Increased treatment facilities would be required in Story City, resulting from population growth and/or annexation. Treatment needs produced by growth on the reservoir's west side area are also projected. Two regional alternatives, each costing $1.3 million in capital costs, to alleviate waste water problems are examined. (See also W74-11614) (Schroeder-Wisconsin)
W74-11621

URBAN FLOOD DAMAGES,
Iowa State Univ., Ames. Dept. of Civil Engineering.
R. L. Rossmiller, and M. D. Dougal.
In: Ames Reservoir Environmental Study. Appendix 5. Physical Relationship with the Urban Sector, Iowa State Univ. Report ISWRRI-60-A5, 1973, p 5-8-i--5-8-26. 5 fig, 7 tab, 11 ref.

Descriptors: *Cities, *Iowa, *Flood control, Watershed management, Flood plain zoning, Flood plains, Nonstructural alternatives, Flood damage, Reservoir construction, Alternative planning, Land use, Flood protection, Legislation, Zoning.
Identifiers: *Skunk River Basin(IA), *Ames Reservoir(IA), Story City(IA), Colfax(IA), Reasnor(IA).

Of the total $14,872,000 estimated flood damages resulting within Iowa's Skunk River Basin in six major periods only $29.600 was attributable to urban communities. The impact on urban flood damage of the proposed multiple-purpose Ames Reservoir is explored for Ames, Story City, Colfax, and Reasnor. The flood plain of Story City is devoted to public uses including a park, a golf course, an athletic field, and a sewage treatment plant. Under the proposed Ames Reservoir, the flood plain will be inundated. An additional $244,000 worth of work, including control levees and road elevation is needed to protect much of the existing flood plain improvements. A reduction of the proposed reservoir's conservation pool and flood storage will eliminate the need for this remedial work. At Ames, most of the flood plain is devoted to agricultural or park purposes as existing zoning and management policies have limited new construction within that city's flood plain. The proposed reservoir will eliminate flood damage to the city. Reasnor and Colfax flood damage predicted through the log normal flood frequency method indicates that additional benefits will result from the proposed reservoir. Flood plain management to reduce flood damage in the basin is also discussed. (See also W74-11614) (Schroeder-Wisconsin)
W74-11622

AMES RESERVOIR ENVIRONMENTAL STUDY. APPENDIX 6. DETAILED ECONOMIC REVIEW AND PROJECT EVALUATION.
Iowa State Water Resources Research Inst., Ames.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 405, $9.00 in paper copy, $2.25 in microfiche. Report ISWRRI-60-A6 (IURR-FRS-9-A6), 1973. 116 p, 1 fig, 25 tab, 10 ref. OWRT A-999-IA (8f).

Descriptors: *Decision making, *Social participation, *Reservoir design, *Evaluation, Iowa, Economic impact, Water resources development, Regional development, Social impact, Social needs, Economic efficiency, Cost-benefit analysis, Cost-benefit ratio, Cost analysis, Interest rates, Economic life, Multiple-purpose projects.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

This examination of physical, social, and economic implications of Iowa's proposed Ames Reservoir includes results of an economic analysis of alternative development plans on the Skunk River. A reassessment of the Corps of Engineers projected costs and benefits arising from the alternative designs is first considered. The unit costs utilized by the Corps were judged realistic. Projected total costs, not including land costs, of the Ames Reservoir were shown to rise significantly with postponement, varying from $9,829,000 - 1968 to $37,052,000 - 1990. The benefit-cost generated by the Corp's assuming a 3-1/4% interest rate, a 100-year project life, and a log-normal flood frequency approach equaled a 1.6:1 ratio. Under alternative assumptions of a 4-5/8, 5-1/2 or 7% interest rates-- the latter two representing current FY '73--and proposed Water Resources Council rates, a 50-year life, and the USGS regional flood frequency methods, significant declines in the benefit-cost ratios were found. An alternative evaluation procedure--incident impact approach--is also considered. The approach generates a relationship between allocative designs' consumptive and productive activities and resultant physical, social, and political impacts. Affected interest groups are identified and impacts displayed to facilitate each group's participation in the decision process. (See W74-11624 thru W74-11627) (Schroeder-Wisconsin)
W74-11623

PROJECT IMPACT EVALUATION,
Wisconsin Univ., Madison. Dept. of Agricultural Economics.
D. Bromley.
In: Ames Reservoir Environmental Study. Appendix 6. Detailed Economic Review and Project Evaluation, Iowa State Univ., Ames, Report ISWRRI-60-A6 (IURR-FRS-9-A6), 1973, p 6-1-2--6-1-24. 6 ref.

Descriptors: *Project planning, *Decision making, *Water resources development, *Evaluation, Economic impacts, Social participation, Reservoir design, Iowa, Environmental effects.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Project impact evaluation.

Water development project evaluation procedures are explored. Traditional evaluation procedures have generally been criticized because they are apparently used only to justify a local coalition of affected interest groups to predetermine project design. The Water Resources Council has asserted instead that planners should ascertain whether the project design will effectively contribute to broad national and regional development, environmental quality, and social well-being. Such an approach is inadequate because of its failure to embrace the basic rationale that governmental intervention is to provide assistance in solving local water-related problems. A third evaluation procedure, impact analysis, seeks to identify all relevant impacts on local interest groups, and to facilitate broad participation in the decision process. The effectiveness of any interest group in promoting its goals depends on a number of factors including its status, number, and commitment. Methods to value these impacts are discussed. Monetary impacts may be valued using an intermediate good method, inferences from price-quantity behavior, market analogy and alternative costs, or the administrative fiat approach. Non-monetary impact must be displayed in a manner which facilitates understanding. Use of an impact matrix to display both impact forms and to facilitate ready comprehension by those affected is suggested. (See also W74-11623) (Schroeder-Wisconsin)
W74-11624

A REVIEW OF COST ESTIMATES FOR PROPOSED AND ALTERNATIVE DESIGNS, AMES RESERVOIR, SKUNK RIVER, IOWA.
Green (Howard R.) Co., Cedar Rapids, Iowa.
In: Ames Reservoir Environmental Study. Appendix 6. Detailed Economic Review and Project Evaluation, Iowa State Univ., Ames, Report ISWRRI-60-A6 (IURR-FRS-9-A6), 1973, p 6-2-i--6-2-18. 1 fig, 6 tab.

Descriptors: *Estimated costs, *Reservoir design, *Alternate planning, Cost analysis, Evaluation, Iowa, Elevation, Reservoir operation.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Cost estimates prepared by the Corps of Engineers for Iowa's proposed Ames Reservoir are reassessed and a major alternate design (wherein the dam and spillway would be lowered ten feet below the original design) which would reduce the project's scope is evaluated. Additional construction costs resulting from future delays are assessed for 1973, 1975, 1980 and 1990. The modified design will reduce the storage surface area by 45,000 and 18,000 acre-feet for the full flood control and conservation pools, respectively. Under the original design levees would be constructed at Story City to protect against flooding until the water surface elevation reaches 981 feet. Under the alternate design no levees would be constructed with consequent potential inundation of areas containing the waste treatment plant, sewage plant, wells, and lift stations in Story City. A review of unit costs used by the Corps proved them realistic. Projected total costs, not including land costs, varied from $9,829,000, $13,387,000, $15,182,000, $20,496,000, and $37,052,000 for 1968, 1973, 1975, 1980 and 1990. Cost differential between the original design and the modified design using 1968 prices resulted in a $1,733,700 reduction. (See also W74-11623) (Schroeder-Wisconsin)
W74-11625

PROJECT BENEFIT-COST ANALYSIS,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
K. J. Dueker.
In: Ames Reservoir Environmental Study. Appendix 6. Detailed Economic Review and Project Evaluation, Iowa State Univ., Ames, Report ISWRRI-60-A6 (IURR-FRS-9-A6), 1973, p 6-3-i--6-3-24. 10 tab, 4 ref.

Descriptors: *Cost-benefit analysis, *Economic justification, *Reservoir design, Cost comparisons, Cost-benefit ratio, Cost analysis, Interest rates, Indirect costs, Benefits, Water resources development, Iowa, Flood frequency, Feasibility studies, Financial feasibility, Diseconomies of scale.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Inflation impact.

Benefits and costs estimates of Iowa's proposed Ames Reservoir made by the Corps of Engineers are reassessed. The Corps was required to utilize an interest rate of 3-1/4%, a 100-year project life, and a log-normal flood frequency approach. The review re-examines the sensitivity of benefit and cost estimates utilizing interest rates of 4-5/8, 5-1/2 and 7%, the latter two representing the FY 1973 and proposed Water Resources Council rates, respectively. A 50-year useful life and the USGS regional method of forecasting flood frequency were also substituted. Utilizing 1968 benefit and cost estimates, the 4-5/8% interest rate and the assumptions of the Corps earlier benefit-costs, ratio estimate decreased from 1.6:1 to 1.3:1. Similarly,

under 1973 benefit and cost estimates, and the Corps guidelines for flood and low-flow augmentation, benefit-cost ratios of 1.4:1, 0.95:1 and 0.77:1 were estimated under interest rates of 3-1/4, 5-1/2 and 7%. Utilizing the USGS frequency method and an interpretation that EPA water quality standards require advanced treatment, benefit-cost ratios of 0.8:1, 0.54:1, and 0.43:1 were generated, respectively. Costs and benefits including loss of the tax base, access to gravel resources, and of income to agricultural suppliers, not generally included in traditional benefit-cost analyses, are also considered. (See also W74-11623) (Schroeder-Wisconsin)
W74-11626

BROADER EVALUATION CONSIDERATIONS,
Iowa Univ., Iowa City. Inst. for Urban and Regional Research.
J. S. Drake, K. J. Dueker, and J. F. Hultquist.
In: Ames Reservoir Environmental Study. Appendix 6. Detailed Economic Review and Project Evaluation, Iowa State Univ., Ames, Report ISW-RRI-60-A6 (IURR-FRS-9-A6), 1973, p 6-4-i--6-4-33. 9 tab.

Descriptors: *Environmental effects, *Water resources development, *Reservoir design, Economic impact, Political aspects, Regional development, Decision making, Iowa, Social impact, Social participation, Institutions, Evaluation, Alternative planning.
Identifiers: *Project impact, *Ames Reservoir(IA), *Skunk River Basin(IA).

An incident impact evaluation paradigm, providing a balanced purview of monetary and nonmonetary impacts, causes and incidences is developed and a broad strategy to utilize the resultant data to facilitate wider public participation in the evaluation process is suggested. To illustrate the paradigm, impacts resulting from nine alternative project designs on Iowa's Skunk River Basin include the proposed Ames Reservoir, a tributary development lake, a green belt design, and the preservation of the status quo are identified. The paradigm is composed of two stages. In the first, the relationship between physical, social, and political impacts are related to a number of production and consumption activities involved in each alternative. Impacts identified under each pair of impacts and activities, for instance, include physical production: reduction in upstream resources; physical consumption: equilibrium levels of reservoir/stream water quality and the creation of mud flats; social production: disruption of households; social consumption: patterns of residential development, and political production: loss of local tax base. The second stage of the paradigm identifies special interest groups and articulates the incidence and level of impacts accruing to each. For example, impacts of concern for recreational and agricultural interest groups are displayed for each of the nine alternatives examined. (See also W74-11623) (Schroeder-Wisconsin)
W74-11627

URBAN WATER RESOURCES--SOME PLANNING FUNDAMENTALS,
Cornell, Howland, Hayes and Merryfield, Reston, Va.
L. S. Costello.
Journal of the Urban Planning and Development Division, American Society of Civil Engineers, Vol 100, No UP1, Proceedings paper No 10413, p 57-71, March 1974. 6 fig, 1 tab, 6 ref.

Descriptors: *Regional planning, *Water resources development, *Systems analysis, Computer programs, Standards, Costs, Decision making, Management, *Alternative planning, Cities, Urbanization, *City planning.
Identifiers: Objectives, Impact, Policies, Social participation.

The deteriorating quality of surface and subsurface waters in urban regions has prompted a review of planning fundamentals. The management process involves the initiation of political leadership, establishment of a goals structure, identification of alternatives and courses of action, evaluation of alternatives, selection of a course of action, implementation of the selected alternatives, and measurement of the performance of the previous action. A goals structure is proposed that offers operational definitions for values, goals, objectives, standards, policies, plans, and programs. A process for measurement of program performance with respect to goal achievement is given. A systems definition of the urban water resource provides a basis for the identification of alternate courses of action. Displaying alternate decisions using a decision tree is illustrated. Monetary costs, potential impact, and implementability are suggested as a framework to compare alternatives. (Bell-Cornell)
W74-11645

DAMAGE ASSESSMENT OF HOUSEHOLD WATER QUALITY,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5C.
W74-11646

NUCLEAR POWER AND PUBLIC OPINION,
Portland General Electric Co., Oreg.
For primary bibliographic entry see Field 5G.
W74-11656

SURVEY OF ECONOMIC-ECOLOGIC IMPACTS OF SMALL WATERSHED DEVELOPMENT,
Georgia Univ., Athens. Inst. of Natural Resources.
R. M. North, A. S. Johnson, H. O. Hillestad, P. A. R. Maxwell, and R. C. Parker.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 407, $4.75 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No ERC-0974, June 1974. 122 p, 10 fig, 28 tab, 33 ref.

Descriptors: *Evaluation, *Project feasibility, Benthos, Flood control, Water supply, Recreation, *Wildlife habitats, Benefits, Economic justification, Income analysis, *Environmental effects, Small watersheds.
Identifiers: *Ecological impact, Land values, Tree growth.

Water resources project evaluation methodology is examined in order to identify values and procedures that will more fully account for positive and negative project-induced changes to the economy and ecology of an area. A detailed case study of two small projects was used (1) to compare actual with pre-estimated benefits and costs, (2) to estimate other ecologic and economic changes induced by the projects, and (3) to suggest methods for better prediction of impacts from future projects. Economic and ecologic impacts over a period of up to 15 years after project completion were measured. These results were compared with the project planning estimates, and an analogue pair of similar watersheds were studied to control for exogenous (non-project) impacts or activities. Measurements were made of flood protected areas, tree growth with stream modification, benthos and fish populations, water quality and wildlife with stream modification, and of such surrogate indicators of impact as land values and incomes. Ex ante estimates of benefits and costs were found subject to several measurement and prediction errors which reduced realized (ex post) benefit-cost ratios to 0.2 to 0.5. The small watershed projects studied did not perform as well as expected, primarily due to exogenous factors such as the general decline of agriculture in the watersheds. The ecologic impacts measured were not judged to be serious, either positively or negatively. Tree growth, benthos and fish populations, and water quality were not significantly different between project and non-project watersheds. The report provides useful quantitative information on the environment impact of small watershed projects. (James-Geo Tech)
W74-11680

PROCEEDINGS OF THE URBAN WATER ECONOMICS SYMPOSIUM.
Newcastle Univ. (Australia). Dept. of Economics.
Symposium held at the University of Newcastle, New South Wales, Australia, on 28 April 1973. C. Aislabie, editor. Published by the University of Newcastle Research Associates Limited, Newcastle, 1973. 188 p. $6.00.

Descriptors: *Australia, Water supply, *Water supply development, *Pricing, Cost allocation, *Water demand, *Planning, *Management, Water costs, Reservoir operation, Flood control, Water consumption, *Economics, *Urbanization, Cities, Water quality, *Watershed management, Water utilization, Cost analysis, Investment.

Papers presented: Payment by Use in Urban Water Supply; Urban Water Catchments: Some Illustrations of Resource Allocation and Conflict Regulation; Water Development and Urban Development in Africa; A Multidisciplinary Policy Decision Model for Water Pollution; Some Aspects of Urban Water Supply in Victoria; Rural and Urban Flood Insurance: A Review; An Opportunity Cost Function for Newcastle's Water; Urban Water Farming; Sampling Errors in Flood Damage Estimates; Towards a Model for Prediction of Residential Water Use; Water Quality Investigations on Forested Catchments in the Cotter River Valley; The Economics of Data Collection; Urban-Rural Conflicts in Urban Water Supply; A Method of Analysis of Residential Water Demand and its Relation to Management Models for Allocation of Water Resources; and A New Direction for Urban Investment and Pricing Decisions. (See W74-11683 thru W74-11697)
W74-11682

PAYMENT BY USE IN URBAN WATER SUPPLY,
Newcastle Univ. (Australia).
For primary bibliographic entry see Field 6C.
W74-11683

URBAN WATER SUPPLY CATCHMENTS: SOME ILLUSTRATIONS OF RESOURCE ALLOCATION AND CONFLICT REGULATION,
Macquarie Univ., North Ryde (Australia).
P. Crabb.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973, University of Newcastle, New South Wales, University of Newcastle Research Associates, Ltd, C. Aislabie, editor, p 19-23, 1973. 21 ref.

Descriptors: *Water allocation(Policy), *Watersheds(Basins), *Reservoir operation, *Water supply management, *Recreation, *Australia, Land use, Water quality control, Water sources, Water costs, Water pollution control, Regulation, Planning.
Identifiers: Adelaide(Aust), Mt. Lofty Ranges(Aust), Melborne(Aust).

The idea of using water catchments for purposes other than water supply has been gaining increasing favor especially in the United States and Britain where extensive recreational use is now being derived from catchment areas. In Australia three approaches to the management of catchment areas have been employed: the laissez-faire, the single purpose, and to a much lesser extent, the multi-purpose approach. The laissez-faire method amounts to minimal control over land and other

resource use. An example is the city of Adelaide which takes 20-50% of its public water supply from the River Murray with the remainder coming from a number of small catchments in the Mt. Lofty Ranges. The lack of control over catchment areas plus rapid development has caused a steadily decreasing water quality, which now violates standards set by the World Health Organization. Major deficiencies exist in color, taste, turbidity, odor and bacteriological quality. Recent measures to alleviate the problem have included regulation of further development, and the purchase of some reservoir land. Seven new treatment plants are being built at a total cost of $35 million, and a cost to consumers of $.85 per 1000 gallons. Melborne restricts use of the Upper Yarra and Watts River catchments solely to water supply; entry to the catchments is prohibited by law. This denies the aesthetic and recreational use of these scenic areas to the urban population which is exerting an increasing demand on water based leisure activities. The increased cost of multi-purpose catchments will reflect the current economic realization that water has for too long been sold at bargain prices. A safe public water supply is still the highest priority, but this does not exclude the use of catchments for a variety of other activities. (See also W74-11682) (LaPointe-North Carolina)
W74-11684

WATER DEVELOPMENT AND URBAN DEVELOPMENT IN AFRICA,
Newcastle Univ. (Australia).
N. J. Dickinson.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973, University of Newcastle, New South Wales, University of Newcastle Research Associates Ltd, C. Aislabie, editor, p 34-48, 1973. 1 tab, 2 ref.

Descriptors: *Water supply development, *Africa, *Geographical regions, *Arid climates, Water resources development, Water management(Applied), Long term planning, Short term planning, *Urbanization, Social change, Population, Distribution patterns, Growth rates, Pipelines, Monsoons.
Identifiers: Rhodesia, Ethiopia, Kenya, Tanzania, Zambia, Malawi, Highveld, Lowveld, Dry seasons.

Emerging nations of Africa confront very unique problems in developing their water supply capabilities. Ethiopia, Kenya, Tanzania, Zambia, Malawi, and Rhodesia are situated on a ridge of high land stretching southwest from Ethiopia to the Cape Province of the Republic of South Africa. Rainfall is seasonal, and averages 20-40 in. per year with at least one long dry season. The best land for future development lies in the upland or highveld region, which necessitates pumping of water from lowland regions or construction of large dam sites. The indigenous population is transient, periodically moving from areas of drought to new regions of available food and water, complicating construction of a permanent water supply. Population growth is high and per capita incomes among the lowest in the world, making large scale capital investment difficult. Rhodesia, endowed with suitable engineering skills, serves as an example of some short run solutions that will permit development and industrialization. With seasonal rainfall, adequate storage capacity must be achieved close to the headwaters of rivers and streams. Salisbury, the capital, is supplied by a number of small dams and reservoirs and from Lake McIlwaine created by dam construction. The other major city, Bulawayo, situated on the edge of a desert will have to limit future growth if local water supplies are not augmented. Long range solutions for Rhodesia, i.e., construction of massive pipelines to pump water to the highveld, and a chain of dams along a major river involve such enormous capital outlays and operations costs as to be totally infeasible at present. (See also W74-11682) (LaPointe-North Carolina)
W74-11685

A MULTIDISCIPLINARY POLICY DECISION MODEL FOR WATER POLLUTION,
Newcastle Univ. (Australia).
For primary bibliographic entry see Field 5G.
W74-11686

SOME ASPECTS OF URBAN WATER SUPPLY IN VICTORIA,
Victoria Water Commission (Australia).
For primary bibliographic entry see Field 6C.
W74-11687

RURAL AND URBAN FLOOD INSURANCE: A REVIEW,
New South Wales Dept. of Agriculture, Sydney (Australia).
For primary bibliographic entry see Field 6F.
W74-11688

AN OPPORTUNITY COST FUNCTION FOR NEWCASTLE'S WATER,
New South Wales Dept. of Agriculture, Wollonghar (Australia). Agricultural Research Center.
For primary bibliographic entry see Field 6C.
W74-11689

SAMPLING ERRORS IN FLOOD DAMAGE ESTIMATES,
New South Wales Univ., Kensington (Australia).
For primary bibliographic entry see Field 6F.
W74-11690

TOWARDS A MODEL FOR PREDICTION OF RESIDENTIAL WATER USE,
Hunter Valley Research Foundation, Tighes Hill (Australia).
For primary bibliographic entry see Field 6A.
W74-11691

WATER QUALITY INVESTIGATIONS ON FORESTED CATCHMENTS IN THE COTTER RIVER VALLEY,
Commonwealth Forestry and Timber Bureau, Canberra (Australia). Forest Research Inst.
For primary bibliographic entry see Field 5B.
W74-11692

THE ECONOMICS OF DATA COLLECTION SYSTEMS,
New South Wales Inst. of Tech., Sydney (Australia).
For primary bibliographic entry see Field 6C.
W74-11693

URBAN-RURAL CONFLICTS IN URBAN WATER SUPPLY,
University of New England, Armidale (Australia).
For primary bibliographic entry see Field 6D.
W74-11694

A METHOD FOR ANALYSIS OF RESIDENTIAL WATER DEMAND AND ITS RELATION TO MANAGEMENT,
University of New England, Armidale (Australia). School of Natural Resources.
B. F. Pullinger.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973. University of Newcastle, New South Wales, University of Newcastle Research Associates, Ltd., C. Aislabie, editor, p 155-170, 1973. 16 ref, 1 append.

Descriptors: *Water demand, *Water management, *Regression analysis, *Economic efficiency, *Pricing, Marginal costs, Marginal benefits, Water use, Statistical methods, Correlation analysis, Domestic water.
Identifiers: Determinants of residential water use.

Because demand for water is believed to be very inelastic with respect to price, water supply economics have been viewed from a 'requirements' approach. Thus legal and physical measures of restricting water consumption have been favored over pricing for short run solutions with creation of additional water supply capacity favored for long term projected increases. Because of the current high and steadily increasing marginal cost of increasing supply, demand management based on marginal pricing policies is becoming a more attractive alternative. Such pricing policies can be formulated by separating out the determinants of demand by multiple regression analysis. A number of previous studies, using a wide range of variables, have yielded price elasticities from minus .2 to minus .5. Such an analysis for Australia might employ the following variables: (1) climatic condition and physical factors such as temperature, precipitation and evapotranspiration rate; (2) family income, in particular the type of housing, ownership of water using equipment, and the area of lawn and shrubs; (3) other household characteristics, like the number and age of persons in residence; (4) type of water service, as measured in number of taps, water pressure, and water quality; and (5) management approach, for example, metering, size of minimum bill, excess water charge, and imposed restrictions. Unfortunately data to fit this model is severely limited, and is painstakingly gathered; however if the importance of each variable could be determined, water demand management could economically influence water demand and more confidently time the construction of additional capacity. (See also W74-11682) (LaPointe-North Carolina)
W74-11695

MODELS FOR ALLOCATION OF WATER RESOURCES,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Building Research.
For primary bibliographic entry see Field 6A.
W74-11696

A NEW DIRECTION FOR URBAN INVESTMENT AND PRICING DECISIONS,
B.H.P. Co. Ltd., Port Waratah (Australia).
G. Walters.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973. University of Newcastle, New South Wales, University of Newcastle Research Associates, Ltd., C. Aislabie, editor, p 177-188, 1973. 12 ref.

Descriptors: *Water resources, *Water management(Applied), *Pricing, *Water costs, Water allocation, Elasticity of demand, Water distribution, Cost-benefit theory, Administrative costs, Water supply, Comparative costs, Economic efficiency, Fixed costs, Variable costs, Payment, *Australia.
Identifiers: Metering.

Flat rate pricing currently preferred in most of Australia's water supply systems encourages waste and provides little data about the benefits and costs of increasing supply. Using the statistical requirements approach to predict future consumption is unsatisfactory because it must assume constant costs for increasing water supply, and a perfectly inelastic demand. Metering, or use charging, has the benefits of reducing consumption (in the U.S.A. metering has reduced consumption by up to 50%) with the consequent deferment of capital expenditure and of providing useful information on price elasticities. These benefits are weighed against costs of installation and administration of a metered system, and loss of consumer surplus. Pricing metered water must incorporate consumer costs of meters, billing, and administration; the capacity costs of providing dams, mains, and reservoirs; and commodity costs of the consummables used in treatment and pumping. The American Water Works Association has

established a base rate for all users to cover consumer costs (fixed). Fifty percent of capacity costs are provided by the base rate and the remaining 50% plus the commodity (variable) costs are assessed by use. The block system of variable pricing (heavy users charged less) should be reexamined in light of the increasing scarcity of water and perhaps be made an increasing price scale instead of the decreasing one developed to encourage water use when water was plentiful. (See also W74-11682) (LaPointe-North Carolina)
W74-11697

THE ECONOMIC DAMAGES OF AIR POLLUTION,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W74-11798

ECONOMIC DAMAGES TO HOUSEHOLD ITEMS FROM WATER SUPPLY USE,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5G.
W74-11930

PROJECTIONS OF RADIOACTIVE WASTES TO BE GENERATED BY THE U.S. NUCLEAR POWER INDUSTRY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5G.
W74-11962

HYDROLOGY AND RECREATION ON THE COLD-WATER RIVERS OF MICHIGAN'S UPPER PENINSULA,
Geological Survey, Lansing, Mich.
G. E. Hendrickson, R. L. Knutilla, and C. J. Doonan.
Michigan Geological Survey Water Information Series Report 4, 1973. 39 p, 24 fig, 8 tab, 27 ref.

Descriptors: *Recreation, *Rivers, *Michigan, *Fishing, Scenery, Aesthetics, Water temperature, Water quality, Vegetation effects, Boating, Hydrologic data, Streamflow, Discharge(Water).

Recreational values of the cold-water rivers of Michigan's Upper Peninsula are dependent on streamflow characteristics, water quality, and character of channel, bed, and banks. All recreational values are generally benefited by relatively uniform streamflow, clear water free from objectionable contaminants, and forested river banks protected from excessive erosion. Trout populations may be limited by stream temperature, bottom vegetation, variability of streamflow, and discharge per unit drainage area. Preservation of recreational values of Upper Peninsula streams chiefly requires the control of manmade changes in the hydrologic environment. (Knapp-USGS)
W74-11986

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

WATER SUPPLIES AND COST IN RELATION TO FARM RESOURCE USE DECISIONS AND PROFITS ON SACRAMENTO VALLEY FARMS,
California Univ., Davis. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 3F.
W74-11568

PAYMENT BY USE IN URBAN WATER SUPPLY,
Newcastle Univ. (Australia).
C. J. Aislabie.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973, University of Newcastle, New South Wales, University of Newcastle Research Associates, Ltd, C. Aislabie, editor, p 1-18, 1973. 11 ref.

Descriptors: *Water demand, *Water supply, *Water utilization, *Pricing, *Cost-benefit analysis, *Water rates, Marginal costs, Constraints, Economics, Cost allocation, Water management(Applied), Elasticity of demand, Interest rates, Income, Economic impact.
Identifiers: Payment by use, Metering, Excessive use charges.

Cost-benefit analysis should be employed to determine whether the expenses incurred in metering individual water use outweigh the benefits derived. Such an analysis must include a specification of the objective function including the units employed; determination of the constraints, which might be policy constraints, political, resource target and/or imaginary constraints; elaboration of the feasible alternatives, realizing the distinction between decision and non-controllable variables; measurement of the costs and benefits of feasible alternatives; and evaluation and choice. Such an analysis could conceivably demonstrate that payment by use is the best alternative under particular circumstances. Marginal cost pricing would force public utilities to have an income less than their expenditure, and new investment would, therefore, be more in the bonds of the federal government. Rating methods encourage wastage of water and cause conflicts between urban and rural users. Rating methods with excessive use charges do eliminate some of the waste but suffer from the problem of very small revenue arising from the excessive use charges, a majority of the users often paying the minimum rate. While payment by use might encounter some difficulty in the selection of the proper social welfare functions, it does allow a gradual reduction in demand by price variation, which would be a short term alternative to installation of new capacity. Sensitivity to such price variation would have to be worked out on a case by case basis. (See also W74-11682) (LaPointe-North Carolina)
W74-11683

SOME ASPECTS OF URBAN WATER SUPPLY IN VICTORIA,
Victoria Water Commission (Australia).
R. W. G. Evans.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973. University of Newcastle, New South Wales, University of Newcastle Research Associates, Ltd, C. Aislabie, editor, p 61-67, 1973.

Descriptors: *Water supply, *Water resources development, *Water storage, *Water rates, Water quality, Pricing, Government finance, Water allocation(Policy), Water harvesting, Capital costs, Reservoirs, Reservoir construction, Reservoir storage, Pipes, *Australia.
Identifiers: Victoria(Australia), Plumatella.

Of the 420 towns in the State of Victoria, 270 have water supplies managed by local authorities, which receive government financial assistance, and are supervised by the State Water Commission. The following matters are considered before any capital works project is undertaken: (1) capacity of existing works; (2) pattern of likely future demand; (3) utilization of stage construction; (4) capital costs; (5) governmental financial assistance towards capital costs; (6) availability of capital funds; (7) local contribution; (8) rating and charging structures. Charging is usually based on a property tax, with separate minimum charges for houses and vacant lots. Industries may receive special bulk charge rates, and metering is encouraged where economically feasible. Periods of dry weather can exacerbate the conflict that exists between rural and urban users, and local water authorities are expected to devise storage facilities adequate to meet low flow needs. Under severe drought conditions water is allocated on a case-by-case basis, however domestic and stock use always takes precedence over irrigation. Proper design and construction of reservoirs and water mains can alleviate many water quality problems. Some solutions for water quality problems are: reservoirs banks should be cleared of all vegetation; multiple level outlets should be provided; sound land use policies should be employed around catchment areas; continuous chlorination should be used to prevent Plumatella growth in pipes; and careful housekeeping policies such as periodic flushing and cleaning of water mains should be regular maintenance operations. (See also W74-11682) (LaPointe-North Carolina)
W74-11687

AN OPPORTUNITY COST FUNCTION FOR NEWCASTLE'S WATER,
New South Wales Dept. of Agriculture, Wollonghar (Australia). Agricultural Research Center.
D. P. Godden.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973, University of Newcastle Research Associates, Ltd, C. Aislabie, editor, p 78-79, 1973. 7 ref.

Descriptors: *Pricing, Water resources development, *Management, *Water harvesting, Water demand, Water rates, Roofs, Runoff, Water supply, Water supply development, Economic feasibility, Economic justification, Industrial water, Benefits, *Costs, Cost-benefit analysis, *Australia.
Identifiers: *Opportunity costs, Home-gathered water, *Newcastle(Aust).

Opportunity cost can be defined as the value of a given good in its best alternative use. In New South Wales industry is a significant water user and opportunity cost schedules based on industrial demand curves would not be difficult to prepare. Such schedules could then be used to establish a price dependent demand function for domestic water. This is one method of moving from the present 'requirements'-based pricing system to an economics-based system. (See also W74-11682) (LaPointe-North Carolina)
W74-11689

THE ECONOMICS OF DATA COLLECTION SYSTEMS,
New South Wales Inst. of Tech., Sydney (Australia).
A. Pattison.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973. University of Newcastle, New South Wales, University of Newcastle Research Associates Ltd., C. Aislabie, editor, p 119-144, 1973. 2 tab, 11 ref.

Descriptors: *Economic justification, Engineering, *Data collections, *Cost-benefit analysis, *Data processing, Data storage and retrieval, Data transmission, Reservoirs, Flood recurrence interval, Flood control, Flood data, Gaging, Design data, Design criteria, Planning, Water supply development.
Identifiers: Sensitivity analysis.

Very little work has been done on establishing an economic justification for data collection. Presently most data is collected over a short term time interval, with little attention to the benefits and costs of long term data gathering. The purpose of a data collection system is to furnish information upon which water supply, and system design criteria can be formulated. Two types of data are needed: socioeconomic concerning users' preferences and demands, and engineering such as hydrologic information, hydraulic characteristics and construction costs. Total costs for data gathering would be the total costs of data collection, processing, storage and retrieval. One way to relate costs of data to the benefits derived from improved design is to estimate the costs of an inferior design, as, for example, if insufficient data caused

an overestimation of reservoir capacity and a larger than necessary spillway was constructed. An underestimation of capacity, however, is more difficult to calculate because of the catastrophic flood damage that could result and possible loss of life. Sensitivity of flood flow prediction to flow data is very pronounced, a 100 year return period requiring 115 years of record to predict magnitude within 10% for 95% of the time. If only 30 years of record are available differences of minus 54% to plus 70% are possible. For a record of 10 years the range is minus 67% to 211%. A recent Canadian study, involving streamflow data, related estimation errors and time period of collection project expenditure. Similar analyses should be applied to all types of data used in urban water supply design and planning. (See also W74-11682) (LaPointe-North Carolina)
W74-11693

A NEW DIRECTION FOR URBAN INVESTMENT AND PRICING DECISIONS,
B.H.P. Co. Ltd., Port Waratah (Australia).
For primary bibliographic entry see Field 6B.
W74-11697

THE ECONOMIC DAMAGES OF AIR POLLUTION,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5A.
W74-11798

ECONOMIC DAMAGES TO HOUSEHOLD ITEMS FROM WATER SUPPLY USE,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5G.
W74-11930

A COMPUTER MODEL FOR EVALUATING COMMUNITY PHOSPHORUS REMOVAL STRATEGIES,
JBF Scientific Corp., Burlington, Mass.
For primary bibliographic entry see Field 5D.
W74-11931

6D. Water Demand

URBAN WATER SUPPLY CATCHMENTS: SOME ILLUSTRATIONS OF RESOURCE ALLOCATION AND CONFLICT REGULATION,
Macquarie Univ., North Ryde (Australia).
For primary bibliographic entry see Field 6B.
W74-11684

WATER DEVELOPMENT AND URBAN DEVELOPMENT IN AFRICA,
Newcastle Univ. (Australia).
For primary bibliographic entry see Field 6B.
W74-11685

URBAN-RURAL CONFLICTS IN URBAN WATER SUPPLY,
University of New England, Armidale (Australia).
J. J. J. Pigram.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973. University of Newcastle, New South Wales, University of Newcastle Research Associates Ltd., C. Aislabie, editor, p 145-154, 1973.

Descriptors: *Water shortage, Water supply, *Water supply development, Water resources development, Water requirements, *Australia, Water users, Projections, Planning, Forecasting, Growth rates, Rural areas, Irrigation, Agriculture, Groundwater, Industrial water, Domestic water, Competing uses.
Identifiers: *Namoi River Basin(Aust), *Tamworth(Aust), Gunnedah(Aust), *Urban-rural conflicts.

The regional water resources of the Namoi River Basin, Australia, and either relationship to the water supply-demand situation for the urban centers of Tamworth and Gunnedah are surveyed. Tamworth, with a population over 24,000, serves as a regional capital for much of the Namoi Region. Present rapid growth could be hampered in the future by an inadequate water supply. In 1970, 1300 million gallons were consumed, 75% in domestic use, 25% by industry, and less than 1% by railroads. Irrigation water is supplied by over 50 wells, and future wells are planned. Of four proposed solutions for future surface water supply, a decision was made in 1971 to construct an earth and rockfill dam at Bowling Alley Point, with scheduled completion by 1979 at a cost of $8 million. Tamworth will receive 25% of average annual yield. Gunnedah (population 8000) relies solely on groundwater for urban water supply, utilizing two wells and six bores with a maximum capacity of 185,000 gallons per hour. High evapotranspiration makes per capita consumption high, at 165-200 gallons per day. By 2000, a projected population of 15,000 will require in excess of 1400 million gallons per year. The only reasonable surface supply is Keepit Dam, now used solely for agricultural purposes. Competition for this water appears inevitable, especially if one of the Valley centers is selected as a regional growth center. Due to the importance of water in the Namoi Valley, total planning for future allocation between competing uses is essential, and such planning should weigh not only economic development, but also the noneconomic considerations such as aesthetic values and wilderness conservation. (See also W74-11682) (LaPointe-North Carolina)
W74-11694

A METHOD FOR ANALYSIS OF RESIDENTIAL WATER DEMAND AND ITS RELATION TO MANAGEMENT,
University of New England, Armidale (Australia). School of Natural Resources.
For primary bibliographic entry see Field 6B.
W74-11695

TOCKS ISLAND LAKE PROJECT,
Tippetts-Abbett-McCarthy-Stratton, New York.
For primary bibliographic entry see Field 6A.
W74-11891

6E. Water Law and Institutions

IMPACT OF PROPOSED AMES RESERVOIR ON STORY COUNTY CONSERVATION BOARD PROGRAMS,
Story County Conservation Board, Iowa.
For primary bibliographic entry see Field 6B.
W74-11603

RESEARCH PROSPECTUS FOR MARINE POLLUTION CONTROL IN THE GREAT LAKES.
Kearney (A.T.), Inc., Chicago, Ill.
For primary bibliographic entry see Field 5G.
W74-12000

6F. Nonstructural Alternatives

EXTENT AND DEVELOPMENT OF URBAN FLOOD PLAINS,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4C.
W74-11492

FLOOD PLAIN INFORMATION, OHIO RIVER: OHIO COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-11677

RURAL AND URBAN FLOOD INSURANCE: A REVIEW,
New South Wales Dept. of Agriculture, Sydney (Australia).
G. A. Forsythe.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973, University of Newcastle, New South Wales, University of Newcastle Research Associates Ltd, C. Aislabie, editor, p 68-75, 1973. 9 ref.

Descriptors: *Floodplain insurance, *Flood protection, *Flood damage, *Flood control, Risks, Cost-benefit ratio, Economies of scale, Regional development, Cost sharing, Cost allocation, Land use, Land management.
Identifiers: Insurance premiums, Mandatory insurance.

Structural measures for flood mitigation can lead to inefficient floodplain land use by giving landowners a false sense of security. In many cases such structural measures are not consistent with environmental quality. Floodplain insurance offers a reasonable alternative with some advantages. Insurance will ease the landowner's burden of flood damage. If premiums are accurately related to rules involved, maximization of the benefits of floodplain land should result, with the occupant aware of the risks he is incurring. The cost of structural measures is usually borne by the general public; however insurance premiums could be used to finance such construction, and thus the cost would be paid directly and solely by the major beneficiaries. The major disadvantage with floodplain insurance is the difficulty of viable operation in actuarial sense. Since a flood effects almost all the residents in the floodplain, damage claims can be many and large. This prevents averaging out the claims with the premiums, and could lead to extremely high premiums for reinsurance. This disadvantage could be alleviated by governmental backing or by policies taken out for extended time periods covering many floodplains. Mandatory full flood plain insurance would lower premiums by reducing sales costs, but would discourage policy holders from investing in structural controls. (See also W74-11682) (LaPointe-North Carolina)
W74-11688

SAMPLING ERRORS IN FLOOD DAMAGE ESTIMATES,
New South Wales Univ., Kensington (Australia).
B. W. Gould.
In: Proceedings of the Urban Water Economics Symposium, April 28, 1973, University of Newcastle, New South Wales, University of Newcastle Research Associates Ltd, C. Aislabie, editor, p 82-98, 1973. 6 fig, 2 ref, 2 append.

Descriptors: *Flood damage, *Flood protection, *Flood plain insurance, *Statistical methods, *Risks, Estimated costs, Estimated benefits, Cost-benefit analysis, Mathematical studies, Sampling, Flood frequency, Flood flow, Estimating, Engineers estimates.
Identifiers: Simpson's rule, Sampling bias, Insurance premiums.

A cost-benefit analysis of a flood mitigation project or a flood insurance policy must consider the costs of project construction and operation and benefits of estimated reduction in flood damage. While there may be some error inherent in accurate projection of costs, engineering cost estimate procedures can be expected to yield a reasonable estimate. Somewhat more difficult is estimation of annual damage risk. Two sets of data must be considered: damage vs. flood height, and flood height

vs. frequency. In estimating insurance premiums, f the value of the property is known, a survey of he area and flow data are used to develop a damage risk curve (total annual damage vs. proba- bility of exceedence). Integration of this curve hen yields the estimated risk. Data inaccuracies cause errors of estimate, however even greater er- rors are produced by the statistical sampling nethodology. A series of experiments conducted using somewhat simplified frequency damage rela- ionships showed that an increment size of 0.3 imes the standard deviation gave a sufficient degree of accuracy (following Simpson's rule), and that samples generally slightly over-estimated he damage. Another source of error, malfunction of drainage systems, is not believed to be amena- ble to mathematical prediction. (See also W74-11682) (LaPointe-North Carolina)
W74-11690

ON A FLOOD PLAIN: CAN A RIGHT GO WRONG,
Office of the Chief of Engineers (Army), Washing- ton, D.C.
G. R. Phippen.
Water Spectrum, Vol 6, No 1, p 31-37, 1974. 7 fig, 1 tab.

Descriptors: *Floodplain zoning, *Floodplain insurance, *Flood damage, *Flood control, *Land use, Floodplains, Properties, Flood protection, Property values, Land classification, Land management, Tax rates, Regulation, Legal aspects, Legislation, Constitutional law, Flood recurrence interval, Flow resistance, Compensation.
Identifiers: Intermediate Regional Flood.

Uncontrolled development of floodplains often results in severe individual losses and a shifting of individual losses to others, with subsequent losses of community services, higher flood levels brought about by impeded flow, encroachment on productive fish and game habitats, and high costs of relief efforts. Because of these larger effects on the broader population, recent efforts to control floodplain development have been vigorous. Such efforts seek to promote the public welfare by minimizing flood losses while at the same time protecting private property rights. The basis of development regulation rests in two Supreme Court decisions in the 1920's. The court held that while zoning laws were a legal application of police power individual ordinances were still subject to attack. Recent State Supreme Court decisions have tended to favor the landowner in proportion to the degree of restrictiveness. Floodplain zoning tends to regulate land use patterns rather than use per se. One way to discourage floodplain development is by taxing policies which consider the community losses emanating from a flood. The Federal Government, through the National Flood Insurance Program, requires land use controls for eligibility. The Corps of Engineers now considers needed flood plain regulations as prerequisites for local cooperation prior to Federal investment, and suggests the 100 year Intermediate Regional Flood as a planning base. Increased interest in flood hazard information supplied to Federal agencies and those seeking Federal financial aid by the Corps of Engineers as well as increasing urban-suburban interest in flood plain management point up an ever growing awareness of the need for new land use regulations in the definable floodplain. (LaPointe-North Carolina)
W74-11698

FLOOD PLAIN MANAGEMENT IN METROPOLITAN CHICAGO,
Metropolitan Sanitary District of Greater Chicago, Ill.
R. Lanyon.
Civil Engineering-ASCE, (American Society of Civil Engineers), Vol 44, No 5, p 79-81, May, 1974. 2 fig, 1 tab.

Descriptors: Flood plains, *Flood control, *Sewer systems, *Land use, *Flood damage, Flood plain zoning, Water management(Administrative), Governments, Legislation, Hydrologic aspects, *Illinois, Cities, City planning.
Identifiers: *Flood plain management, Technical information, Public control, *Chicago(Ill).

Planning is now underway with cooperation of many levels of government to control land use and flooding in the Chicago area. This flooding was divided into three categories: basement and below grade flooding due to back-up of sanitary sewers from floodwater entering sewer systems through flood and street manholes; direct entrance of surface floodwaters into lower level garages, basements, and subgrade surface living areas; inundation of the above grade frame portions of the structure. Besides such residential damage, municipal flooding occurs on parking areas, playgrounds, highways, and streets. A watershed plan was developed to reduce flood damages and erosion. Two remaining undeveloped flood plain areas were to be placed in public control with the intention of enforcing ordinances against new developments in identified flood hazard areas and the enacting of a technical assistance program to provide floodproofing information where hazards exist. (Prague-FIRL)
W74-11867

FLOOD-PLAIN AREAS OF THE LOWER MINNESOTA RIVER.
Geological Survey, Saint Paul, Minn.
For primary bibliographic entry see Field 7C.
W74-11969

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL STATEMENTS AND WATER RESOURCE PLANNING IN NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
M. M. Hufschmidt.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 265; $4.75 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Completion Report No 94, (UNC-WRRI-74-94), June 1974. 127 p, 6 fig, 4 tab, 55 ref, 3 append. OWRTA-063-NC(1). 14-31-0001-3833.

Descriptors: *North Carolina, *Planning, Regulation, Legislation, *Environmental effects, State governments.
Identifiers: New Hope Lake(NC), Falls of the Neuse(NC), Mills River(NC), Chicod Creek(NC), National environmental policy act, *Environmental impact statements.

The National Environmental Policy Act of 1969 (NEPA) and the 1971 North Carolina Environmental Policy Act have had significant consequences for North Carolina water resources, particularly through their requirements for environmental impact statements (EIS). All EIS flow through a clearance procedure for Federal, State and local public agencies and citizens' groups review and comment. The procedure is working effectively in North Carolina and has resulted in some changes in timing and/or design of a number of water resource projects. In part this has been the result of suits brought in Federal Courts by environmental and local interest groups on a few projects. Equally significant, the environmental statement requirements of NEPA have led to major changes in agency planning procedures in which environmental factors are considered from the earliest stages of planning and public participation is emphasized. Such changes have been made by Federal and State water resource, highway and nuclear power planning agencies. The quality of environmental statements prepared for North Carolina projects, initially poor, has been improving as agencies have gained experience in environmental analysis and as greater resources have been applied to the task. This report summarizes the environmental impact statements prepared on water resources and water resource related projects during 1970-1974, summarizes and evaluates their effectiveness and presents recommendations for improvements in the process. (McJunkin-North Carolina State)
W74-11460

EFFECTS OF SALT MARSH IMPOUNDMENTS ON MOSQUITO POPULATIONS,
North Carolina State Univ., Raleigh. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W74-11461

ECOLOGICAL IMPACT OF THE IN-LINE ARRANGEMENT OF TWO RESERVOIRS AND A METROPOLITAN AREA,
Drake Univ., Des Moines, Iowa,
For primary bibliographic entry see Field 5C.
W74-11571

AMES RESERVOIR ENVIRONMENTAL STUDY. APPENDIX 1 - VOL. 2. NATURAL AND ARCHAEOLOGICAL RESOURCES OF THE RESERVOIR SITE AND STREAM SYSTEM,
Iowa State Water Resources Research Inst., Ames.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 400, $27.25 in paper copy $2.25 in microfiche. Report ISWRRI-60-A1-Vol 2, 1973. 449 p, 59 fig, 43 tab, 269 ref. OWRT A-999-IA (8a).

Descriptors: *Reservoir construction, *Reservoir sites, *Environmental effects, Iowa, Biological communities, Ecology, Postimpoundment, Preimpoundment, Alternate planning, Archaeology, Wildlife, Habitats, Ecological distribution, Limnology, Fish populations, Vegetation effects, Vegetation, Forest watersheds, Geologic investigations, Geologic mapping, Ecosystems, Reservoirs.
Identifiers: *Skunk River Basin(IA), *Ames Reservoir(IA), Coralville Reservoir(IA).

Implications of the proposed Ames Reservoir in Iowa are discussed in connection with the upper Skunk River's landscape, vegetation, geology, limnology, wildlife, fisheries, and archaeological resources before the construction of the reservoir and post-construction effects. The reservoir will cause dramatic changes in the region's vegetation; 2100 acres will be permanently inundated with an additional 5000 acres within the maximum flood pool level. Nearly two-thirds of the woodland area and volume along the river will be affected. Most of the decidious and flood plain trees will be destroyed. Large areas of the flood plain will be turned into mud flats dominated by smartweed. The resultant simplified plant community will generally be unable to buffer organic material, nutrients, and soil to the aquatic system. The combination of relative long turnover rates and nutrient levels means that the impoundment's water will be very fertile. Specialized species, top trophic levels, and particular food chains may be eliminated from the terrestrial vertebrate community. Twenty-eight of the existing fish species will be lost, with detritus, plankton, and rough fish representing a large portion of the remainder. Nearly all of the archeological sites located in the region will be affected as 23 will be destroyed and 28 seriously damaged. (See W74-11580 thru W74-11585) (Schroeder-Wisconsin)
W74-11579

GEOLOGIC IMPLICATIONS,
Iowa State Univ., Ames. Dept. of Earth Science.
For primary bibliographic entry see Field 6B.
W74-11580

VEGETATION, TIMBER RESOURCES AND FOREST INVENTORY,
Iowa State Univ., Ames. Dept. of Botany and Plant Pathology; and Iowa State Univ., Ames. Dept. of Forestry.
S. D. Cecil, A. C. Groneman, R. Q. Landers, and G. W. Thomson.
In: Ames Reservoir Environmental Study. Appendix 1 - Vol 2. Natural and Archaeological Resources of the Reservoir Site and Stream System, Iowa State Univ. Report ISWRRI-60-A1-Vol 2, 1973, p 1-3-i--1-3-102, 17 fig, 9 tab, 25 ref.

Descriptors: *Environmental effects, *Reservoir construction, *Vegetation, Preimpoundment, Postimpoundment, Mud flats, Vegetation establishment, Water level fluctuations, Census, Reservoir sites, Spatial distribution, Lumber, Forests, Trees.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Impacts of Iowa's proposed Ames Reservoir on the vegetation cover are reviewed. A 1972 inventory of existing vegetation utilizing five vegetation communities and land surface categories was conducted through aerial photography and field surveys over the 22,000 acre site. While individual species distributional cover was not obtained species dominance was observed, showing a wide diversity of plant communities. Transect sketches are provided to visualize the location and characteristics of various plant categories within the study area. Graphic depictions produced by computer provide estimates of surface and vegetation characteristics and mud flat areas in the area of the proposed reservoir and five alternative project designs. The reservoir will drastically change vegetative characteristics losing 2100 acres in the conservation pool and placing 5000 acres within the area of the maximum flood pool. Results of the forest inventory are treated separately with emphasis on total standing timber rather than species composition. Almost one-seventh of the woodland area and volume in Story County and two-thirds of that along the Skunk River will bw seriously affected. Tree varieties highly tolerant to inundation are discussed; black willow, green ash, and cottonwoods are especially flood tolerant. (See also W74-11579) (Schroeder-Wisconsin)
W74-11581

LIMNOLOGICAL AND FISHERIES ASPECTS OF THE RIVER AND THE PROPOSED RESERVOIR,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
For primary bibliographic entry see Field 6B.
W74-11582

SOME ESTIMATED IMPACTS OF THE PROPOSED AMES RESERVOIR UPON WILDLIFE,
Iowa State Univ., Ames. Dept. of Zoology and Entomology.
For primary bibliographic entry see Field 6B.
W74-11583

STALKING THE SKUNK. A PRELIMINARY SURVEY AND APPRAISAL OF ARCHAEOLOGICAL RESOURCES IN THE AMES RESERVOIR, IOWA,
Iowa State Univ., Ames. Dept. of Sociology and Anthropology.
D. M. Gradwohl, and N. M. Osborn.
In: Ames Reservoir Environmental Study. Appendix 1 - Vol 2. Natural and Archaeological Resources of the Reservoir Site and Stream System, Iowa State Univ. Report ISWRRI-60-A1-Vol 2, 1973, p 1-6-i--1-6-14. 7 fig.

Descriptors: *Iowa, *Reservoir construction, *Archaeology, Reservoir sites, Environmental effects, Flooding, History.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Anthropology.

Archaeological investigations of the upper Skunk River, site of the proposed Ames Reservoir, suggest that the area was occupied prior to Euro-American settlement. Artifacts collected through preliminary surficial surveys indicate the presence of prehistoric camps, settlement sites, quarries, collecting stations, and other activity areas in the Woodland, Post-Woodland and Archaic traditions. The proposed reservoir poses a serious threat to nearly all of the existing archaeological sites in the region. Twenty-three will be immediately and totally destroyed by construction activities, permanent inundation and pool wave action. Thirteen other sites will suffer partial destruction because of intermittent inundation and wave action. Seven sites, although not within the reservoir per se, will be included in land acquisition to be developed into recreational areas. Activities in the easement area and immediately adjacent the reservoir pose threats of damage to eight additional sites. Construction of the proposed reservoir increases the prospects that a key to understanding the life and cultures of an ancient people may be lost. Site salvage programs should be instituted to rescue the data for the reconstruction of a more definitive cultural-historical sequence of the area. (See also W74-11579) (Schroeder-Wisconsin)
W74-11584

COMPARATIVE ECOSYSTEMS STUDIES,
Iowa State Univ., Ames. Dept. of Zoology.
W. J. Platt, and J. G. White.
In: Ames Reservoir Environmental Study. Appendix 1 - Vol 2. Natural and Archaeological Resources of the Reservoir Site and Stream System, Iowa State Univ. Report ISWRRI-60-A1-Vol 2, 1973, p 1-7-i--1-7-82. 21 fig, 13 tab, 174 ref.

Descriptors: *Ecosystems, *Reservoir sites, *Environmental effects, *Biological communities, Ecology, Dominant organisms, Distribution patterns, Postimpoundment, Preimpoundment, Iowa, Reservoir construction, Plant populations, Habitats, Animal populations, Rivers, Water level fluctuations, Fish, Ecological distribution, Vegetation, Systematics, Flood plains, Food webs.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA), Coralville Reservoir(IA), Iowa River, Trophic structures.

Studies were conducted at Iowa's proposed Ames Reservoir site and the existing Coralville Reservoir to project the extent of ecosystem disruption that will occur at the Ames site. Quadrants were set up at the two sites and a lowland prairie and samples taken from each to determine the disruption of the plant community. Presently much of the Skunk River Basin, site of the proposed project, contains deciduous and flood plain trees which will be destroyed by the impoundment. Large areas of this flood plain will be turned into mud flats dominated by ruderal, a form of plant community generally unable to buffer the nutrients, organic materials, and soil to the aquatic system. In the terrestrial vertebrate community specialized species, top trophic levels and particular food chains may be eliminated and small mammals and their predators, often found in the meadows and fields to be inundated, will be rare or nonexistent. Twenty-eight out of 38 species of fish presently found in the area to be flooded will be eliminated with a return to highly generalized species; species surviving the inundation will be detritivorous, planktivorous or omnivorous. Species lists of the plant and animal communities examined are provided. (See also W74-11579) (Schroeder-Wisconsin)
W74-11585

AMES RESERVOIR ENVIRONMENTAL STUDY. APPENDIX 3. OUTDOOR RECREATION AND OPEN SPACE.
Iowa State Univ., Ames.
For primary bibliographic entry see Field 6B.
W74-11597

COSTS OF RECREATION BENEFITS,
Iowa Univ., Iowa City. Inst. of Urban and Regional Research.
For primary bibliographic entry see Field 6B.
W74-11600

AMES RESERVOIR ENVIRONMENTAL STUDY. APPENDIX 4. PHYSICAL RELATIONSHIPS WITH THE AGRICULTURAL SECTOR.
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 6B.
W74-11605

AGRICULTURAL LAND USE PATTERNS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6B.
W74-11606

WATER QUALITY IMPLICATIONS OF CROPLAND NUTRIENTS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
H. P. Johnson, and J. L. Baker.
In: Ames Reservoir Environmental Study. Appendix 4. Physical Relationships With the Agricultural Sector, Iowa State Univ. Report ISWRRI-60-A4, 1973, p 4-2-i--4-2-44. 2 fig, 10 tab, 34 ref.

Descriptors: *Farm management, *Fertilizers, *Water pollution sources, Nutrients, Leaching, Nitrates, Phosphates, Translocation, Iowa.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

The impact of agricultural fertilizers on the water quality of Iowa's proposed Ames Reservoir is considered with primary emphasis on nitrogen and phosphorus levels. The Skunk River watershed, site of the proposed reservoir, is a relatively level, recently glaciated area, with little drainage way development, except near major streams. Nearly all of the level land is tile drained. The project area is heavily cropped with 70-75% of the watershed tilled and 90-95% of the tilled land in corn and soybeans. Fertilizer application in the region is 10-20% above the Iowa average. A 1972 systematic sampling and analysis of the Shunk River indicated nitrate-N levels from 3 ppm in April to over 10 ppm in the remainder of the year; ammonia-N concentration levels ranged from 4 ppm during snowmelts to less than 1 ppm the remainder of the year; and phosphate-phosphorus levels varied from 0.12-0.83 ppm with the highest during snowmelt. Tile effluent and subsurface ditch bank seepage were apparently the primary sources of nitrate-N in the river in 1972. About 2 lbs/ac of organic N (sediment) and about 0.8 lb/ac of P in particulate matter were added to the flow. BOD concentrations at one sampling station varied from 2.2 - 7.1 ppm. (See also W74-11605) (Schroeder-Wisconsin)
W74-11607

WATER QUALITY IMPLICATIONS OF PESTICIDES,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. L. Baker.
In: Ames Reservoir Environmental Study. Appendix 4. Physical Relationships With the Agricultural Sector, Iowa State Univ. Report ISWRRI-60-A4, 1973, p 4-3-i--4-3-26. 1 fig, 2 tab, 44 ref.

Descriptors: *Pesticides, *Herbicides, *Insecticides, Fishkill, Persistence, Pesticide toxicity, Pesticide kinetics, Path of pollutants, Farm management, Iowa, Application methods, Biodegradation, Reservoirs, Water pollution sources.
Identifiers: *Ames Reservoir(IA), *Skunk River Basin(IA).

Farmers' decisions concerning the type, level, and form of pesticide and herbicide application, the susceptibility of non-target organisms to these chemicals and the effectiveness of various transport mechanisms (TM) which disperse and change their chemical forms often have significant impacts on water quality and potential environmental damage. TM, including runoff and volatilization, depend on the physical and chemical properties of the pesticide as well as application and associated tillage practices. To illustrate the implications of various insecticides and herbicides on the environment, a number of Iowa based recent chemical studies are summarized. In general, the chlorinated hydrocarbon insecticides evaluated were practically insoluble in water and generally not susceptible to chemical breakdown. They are very persistent and although found in low concentrations in water are highly concentrated in the organic matter associated with the soil. Organophosphorus and carbomate insecticides are less persistent or toxic to fish, but are highly toxic to mammals. Recent EPA directives have led to greater use of these forms. Herbicides examined have low mammalian toxicity, are used in low dosages, generally have a shorter half-life, and may pose a less serious threat to the environment than the insecticides. (See also W74-11605) (Schroeder-Wisconsin)
W74-11608

ALTERNATIVE LAND AND WATER MANAGEMENT PROGRAMS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 6B.
W74-11613

CURRENT PROBLEMS IN THE RADIOECOLOGY OF SOILS AND PLANTS,
Safarik Univ., Kosice (Czechoslovakia).
For primary bibliographic entry see Field 5B.
W74-11666

ECOLOGICAL-ENVIRONMENTAL ASSESSMENTS RELATED TO THE FEDERAL REPOSITORY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11672

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED COMANCHE PEAK STEAM ELECTRIC STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-11674

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED SUMMIT POWER STATION UNITS 1 AND 2 - DELMARVA POWER AND LIGHT COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-11675

SURVEY OF ECONOMIC-ECOLOGIC IMPACTS OF SMALL WATERSHED DEVELOPMENT,
Georgia Univ., Athens. Inst. of Natural Resources.
For primary bibliographic entry see Field 6B.
W74-11680

ENVIRONMENTAL RESEARCH PUBLICATIONS, JANUARY 1971-JULY 1973.
National Environmental Research Center, Cincinnati, Ohio. Technical Information Office.
For primary bibliographic entry see Field 5G.
W74-11746

ENVIRONMENTAL MONITORING REPORT, PERIOD COVERING MAY 1, 1973 THROUGH JULY 31, 1973 FOR EL PASO NATURAL GAS COMPANY.
Eberline Instrument Corp., Santa Fe, N. Mex. Santa Fe Lab.
For primary bibliographic entry see Field 5B.
W74-11954

ENVIRONMENTAL CONTROL IN NUCLEAR FUEL REPROCESSING,
Emory Univ., Atlanta, Ga.
For primary bibliographic entry see Field 5B.
W74-11955

HYDROLOGY AND RECREATION ON THE COLD-WATER RIVERS OF MICHIGAN'S UPPER PENINSULA,
Geological Survey, Lansing, Mich.
For primary bibliographic entry see Field 6B.
W74-11986

7. RESOURCES DATA

7A. Network Design

A BAYESIAN APPROACH TO HYDROLOGIC TIME SERIES MODELING,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6A.
W74-11456

ACCURACY OF CURRENT METER MEASUREMENTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11502

ERRORS IN MEASUREMENT OF FLOW BY VELOCITY AREA METHODS,
Waterloopkundig Laboratoriu, Delft (Netherlands).
For primary bibliographic entry see Field 7B.
W74-11560

THE CRITERION OF INFORMATION SUFFICIENCY WITH AUTOMATION OF HYDROLOGICAL MEASUREMENTS,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 7B.
W74-11561

THE ECONOMICS OF DATA COLLECTION SYSTEMS,
New South Wales Inst. of Tech., Sydney (Australia).
For primary bibliographic entry see Field 6C.
W74-11693

NEW GLOBAL WATCH FOR POLLUTION EFFECTS.
For primary bibliographic entry see Field 5A.
W74-11866

A NETWORK FOR CONTINUOUS MONITORING OF WATER QUALITY IN THE TRINITY RIVER BASIN, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 5B.
W74-11995

7B. Data Acquisition

HYDROLOGIC INVESTIGATIONS OF THE GROUNDWATERS OF CENTRAL TEXAS USING U-234/U-238 DISEQUILIBRIUM,
Rice Univ., Houston, Tex. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W74-11465

THE USE OF RADAR IN URBAN HYDROLOGY,
McGill Univ., Montreal (Quebec). Stormy Weather Group.
For primary bibliographic entry see Field 2E.
W74-11468

SYMPOSIUM ON HYDROMETRY, VOLUME I AND II.
Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, 1973. 892 p (total of volumes I and II).

Descriptors: *International hydrological decade, *Water measurement, *Hydrometry, *Stream gages, *Gaging stations, Instrumentation, Data collections, Basic data collections, Hydrologic data, Data processing, Flow measurement, Discharge measurement, Conferences.

This symposium on hydrometry was organized in cooperation with the World Meteorological Organization, the International Association of Hydrological Sciences and the National Committee for the International Hydrological Decade of the Federal Republic of Germany. The scientific program of the symposium covered the following main subjects: measurement of water stages and discharge; measurement of depth, temperature and water quality; measurement of solid matter transport; special techniques, including recording and teletransmission of data; and evaluation of measured data. (See W74-11494 thru W74-11567) (Knapp-USGS)
W74-11493

THE ANALYSIS OF FLOAT AND HYDROSTATIC LEVEL GAUGES AND THE CHOICE OF OPTIMAL VALUES OF THEIR BASIC ELEMENTS,
Gusudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. M. Dimaksian.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 3-10, 1973. 2 fig, 2 ref.

Descriptors: *Water levels, *Gages, *Instrumentation, Calibrations, Telemetry, Measurement, Data collections, Hydrologic data, Flow measurement, Discharge measurement, International hydrological decade.
Identifiers: USSR.

Optimum conditions for the operation of float water-level recorders are attained when the equilibrium of the system is disturbed only within strict limits during the rise or fall in the water level. It is possible to select a given accuracy and a specified range of measurements at the basic design stage. Analysis of the operation of hydrostatic level gages shows that their greatest error lies within 1 cm of water level. (See also W74-11493) (Knapp-USGS)
W74-11494

DIGITAL RECORDING OF WATER LEVELS WITH THE AID OF ACOUSTICS AND ITS APPLICATION TO HYDROLOGICAL PUMPING TESTS,
Bundesanstalt fuer Bodenforschung, Hanover (West Germany).
H. J. Durham, and R. Kohlmeier.

In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 11-30, 1973. 13 fig, 4 ref.

Descriptors: *Aquifer testing, *Instrumentation, *Water levels, *Acoustics, *Drawdown, *Measurement, Computer programs, Data collections, Data processing, Hydrologic data, International hydrological decade.

A new method is proposed for aquifer testing. In pumping tests, the desired data can frequently be obtained only at considerable expense and effort. In most cases, manual recording involves high labor costs and yields few and insufficiently accurate measurements. Detailed evaluation requires an extremely long time. To overcome these difficulties by modern techniques, an automated measuring method was chosen. Ultrasonic vibrators acting as transmitters and receivers are suspended motionless in the water at the groundwater observation points. The transit time of an ultrasonic pulse travelling from the vibrator to the water surface and back is measured with the aid of an extremely accurate microchronometer. The resolving power is about 1 mm. The distances between vibrator and water surface are measured in sequence and recorded (as transit time), together with date and hour of the measurement and the number of the measuring point, on punched tape. From the punched tape, the data are transferred to a magnetic disc where they are available for direct use by the computer. The drawdown curves are graphically and numerically evaluated with the aid of computer programs. (See also W74-11493) (Knapp-USGS)
W74-11495

HYDROMETRIC STATIONS IN ARID ZONES,
Ministry of Agriculture, Jerusalem (Israel). Hydrological Service.
D. Kornitz.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 31-40, 1973. 5 fig.

Descriptors: *Water measurement, *Instrumentation, *Basic data collections, Gages, Telemetry, Flow measurement, Hydrologic data, Data collections, Discharge measurement, Hydrometry, Arid lands, Water resources development, International hydrological decade.
Identifiers: *Israel.

Collection of hydrometric data required for national development plans is being pursued vigorously in Israel. In the arid zones of southern Negev, where many hydrometric stations have been established, serious problems have arisen. Visits to these remote measuring sites are possible only in good weather, and even then mostly by air transport. No direct measurements of discharge or manual collection of water samples is possible during flash floods caused by sudden storms. Sand and dust storms may influence the performance of the instruments. Bed-load and silt clog the intakes of stilling wells. The equipment and instrumentation should therefore be capable of operating satisfactorily over long periods, unattended and under adverse climatic conditions. A strip chart water-level recorder with battery-driven clock mechanism works unattended for periods up to 12 months. Water-level fluctuations are recorded in a stilling well by means of a float. Water levels can be transmitted by electronic means (using stream gages). Automatic water-sampling bottles are filled at different stages on the rising and falling limb of the flood-wave. (See also W74-11493) (Knapp-USGS)
W74-11496

A PORTABLE WATER-STAGE RECORDER FOR EXPERIMENTAL HYDROLOGICAL MEASUREMENTS,
Hydraulic Research Inst., Prague (Czechoslovakia).
J. Martinec.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 41-45, 1973. 4 fig, 3 ref.

Descriptors: *Water measurement, *Gages, *Telemetry, *Instrumentation, Alpine, Basic data collections, Hydrologic data, Data collections, Glaciers, Runoff, Flow measurement, Discharge measurement, International hydrological decade.

Hydrological studies must often be carried out at sites where accurate recording of water-level fluctuations cannot be ensured by the permanent network of water-gaging stations. A light, portable water-stage recorder was developed to synchronize measurements of hydraulic parameters on representative river reaches for research on flow conditions in reservoirs and for investigations of glacier runoff in remote areas. (See also W74-11493) (Knapp-USGS)
W74-11497

WATER-LEVEL TRANSDUCERS,
Hydrological Services Ltd., Sydney (Australia).
D. J. Sherlock, R. L. Hitchcock, and H. L. Stark.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 46-62, 1973. 9 fig, 1 ref.

Descriptors: *Water levels, *Water measurement, *Gages, *Australia, Data collections, Basic data collections,, Instrumentation, Stream gages, Discharge measurement, Gaging stations, Hydrologic data, Flow measurement, International hydrological decade.

Two water-level transducers were developed to meet the unusual conditions that are frequently encountered in Australian rivers. In the Sherlock Pressure Sensing Unit, pressure changes in the system impose a load on one side of a balanced beam. This load is balanced by the movement of a weight on a screw actuated by a servo-motor in a follow-up system, which also actuates the recorder. In its standard form, the unit can handle a range of heads up to 70 feet with a sensitivity of 0.01 feet throughout the range. Higher range instruments are also available with a corresponding reduction in sensitivity. In Australia the variety of the climate, range of river level, the variability of streamflow and the remote locations of many gaging stations present conditions which until very recently were beyond the capacity of any available water-level recording equipment. In 1960, the Irrigation and Water Supply Commission, Queensland, evolved a gas-electric transducer which successfully produces continuous records of river level, over ranges in height up to 100 feet in a wide variety of climate conditions, with normal service visits at 6-month intervals. (See also W74-11493) (Knapp-USGS)
W74-11498

STREAM GAUGING NETWORK OF THE LOWER MEKONG BASIN,
National Energy Authority, Bangkok (Thailand).
V. Taweesup.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 63-68, 1973. 1 fig.

Descriptors: *Water measurement, *Rivers, *Stream gages, *Gaging stations, Networks, Data collections, Hydrologic data, Basic data collections, Water levels, Instrumentation, Discharge measurement, Flow measurement, International hydrological decade.
Identifiers: *Mekong River, *Thailand, *Viet-Nam.

A hydrological network was initiated in the lower Mekong basin in February 1959, and in 1973 there were 24 stream-gaging stations on the main stream of the Mekong river and 200 gaging stations in the basin, including its tributaries in four riparian countries. Of these 24 gaging stations, 10 stations are operated by Thailand. The remainder are in Cambodia, Laos and Viet-Nam. Twenty of these stations have automatic stage recorders. (See also W74-11493) (Knapp-USGS)
W74-11499

WATER-LEVEL GAUGING BY PRESSURE MEASURING,
North Rhine-Westfalen Ministry for Food, Agriculture and Forest, Duesseldorf (West Germany).
R. Zayc.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 69-75, 1973. 4 fig.

Descriptors: *Stream gages, *Instrumentation, *Water levels, Gaging stations, Pressure, Telemetry, Basic data collections, Hydrologic data, Flow measurement, Water measurement, Discharge measurement, International hydrological decade.
Identifiers: *Germany.

A pressure transmitting gage for measuring water levels was developed in West Germany and has been used successfully for several years at gaging stations. The maximum measurable range of water-level fluctuation for this type of gage is up to 200 meters. The precision depends on the amplitude to be measured. For up to 10 meter water-level fluctuations, an accuracy of 1 cm can be obtained. In measuring smaller amplitudes, the precision can be improved to several millimeters. (See also W74-11493) (Knapp-USGS)
W74-11500

THE ANALYSIS OF THE POSSIBILITIES OF CURRENT METER OPERATION IN TURBULENT STREAMS,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
P. N. Burtsev, and M. M. Baryshnikova.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 79-85, 1973. 3 fig.

Descriptors: *Current meters, *Instrumentation, *Water measurement, Calibrations, Turbulent flow, Hydrologic data, Basic data collections, Streamflow, Turbulence, Flow measurement, Discharge measurement, International hydrological decade.
Identifiers: *USSR.

Current meters in operation in hydrometric networks in the USSR are reviewed. Special attention is paid to the analysis of the influence of turbulent flow upon the readings of current meters under different working conditions (rod or cable suspension). Some recommendations are given concerning the application of current meters, depending on the hydrodynamic properties of the watercourses and operational practice; probable errors for different types of current meters are discussed. (See also W74-11493) (Knapp-USGS)
W74-11501

ACCURACY OF CURRENT METER MEASUREMENTS,
Geological Survey, Washington, D.C.
R. W. Carter.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Associa-

tion of Hydrological Sciences Publication No 99, Vol I, p 86-98, 1973. 2 fig, 6 tab, 4 ref, append.

Descriptors: *Current meters, *Basic data collections, *Calibrations, Statistics, Statistical methods, Instrumentation, Data collections, Water measurement, Hydrologic data, Flow measurement, Discharge measurement, International hydrological decade.

The probable accuracy of a streamflow measurement made by current meter may be assessed by evaluating the separate error components. Nonrandom error components are: (1) errors in the current meter rating; (2) the error of velocity observation at a point; (3) the error from measuring velocity only at selected points in a vertical; and (4) the error from assuming that the depth and velocity vary linearly between stations in the cross-section. Values for each of these error components are known, based on statistical analysis of special measurements made for this purpose on many different streams. Statistical combination of these errors indicates that the prabable error of a streamflow measurement made by the standard procedures is about 2 percent. This information can be used to determine the optimum observation procedure to attain a desired accuracy. (See also W74-11493) (Knapp-USGS)
W74-11502

CALIBRATION OF CURRENT METERS IN A SUBMERGED JET,
Geological Survey, Washington, D.C.
J. Davidian.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 99-108, 1973. 4 fig, 1 tab, 3 ref.

Descriptors: *Calibrations, *Current meters, *Jets, *Water measurement, *Instrumentation, Hydrologic data, Basic data collections, Flow measurement, Discharge measurement, International hydrological decade.

The feasibility of calibrating current meters in the submerged jet issuing from a cone-like nozzle was investigated. Preliminary tests have shown that this rapid method is of acceptable accuracy and that it could lead to savings in manpower, construction, and maintenance costs. The uniformity of the velocity field in the jet was verified for velocities between 0.25 and 8.0 feet per second. The repeatability of the operation of regular Type AA and Pygmy Price meters was satisfactorily demonstrated. The performance of each meter in the jet, compared to the conventional towing-tank rating of that meter, was within rating tolerances presently accepted. The design of the test facility and desirable design criteria for a permanent structure are described, including dimensions of the forebay, nozzle, and tailbox. The flow recirculation system and flow measurement facilities are discussed. (See also W74-11493) (Knapp-USGS)
W74-11503

THE MAGNITUDE OF ERRORS AT FLOW MEASUREMENT STATIONS,
Water Resources Board, Reading, (England).
R. W. Herschy.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 109-131, 1973. 3 fig, 4 tab, 7 ref, append.

Descriptors: *Water measurement, *Flow measurement, *Calibrations, Statistical methods, Hydrologic data, Data collections, Basic data collections, Stage-discharge relations, Discharge measurement, International decade.

An assessment of the accuracy of hydrometric data produced from flow measurement stations is important to the users of the data. This is particularly so in the case of water resources development. A statistical approach and simple statistical methods for obtaining the error in a single determination of discharge at both velocity-area stations and at weirs and flumes are given. A method is presented for obtaining the standard error of the stage-discharge curve. A statistical test for significance of check gagings is demonstrated. Statistical definitions as they apply to hydrometry are included. (See also W74-11493) (Knapp-USGS)
W74-11504

INSTRUMENTS FOR MEASUREMENT OF CURRENTS AND LEVELS IN NATURAL RESERVOIRS AND RIVERS,
Nauchno-Issledovatelskii Institut Gidrometeorologicheskogo Priborostroeniya, Moscow (USSR).
G. K. Popandopulo.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication, No 99, Vol I, p 142-148, 1973. 3 fig.

Descriptors: *Water measurement, *Current meters, *Stream gages, *Water levels, *Telemetry, Instrumentation, Stage-discharge relations, Basic data collections, Hydrologic data, Flow measurement, Discharge measurement, International hydrological decade.
Identifiers: USSR.

The current recorder used in the USSR is designed for the measurement of current speed and direction to a depth of 300 m. The operating principle of the instrument is based on the transformation of current speed and direction into electric pulses transmitted by cable to recorder. Special features of the instrument are the absence of cable twisting when reading the instrument, the absence of motion when taking readings, and a special pulley which permits automatic measurement of discrete current directions and gives the mean direction every three minutes. The hydrostatic level sensor has a pneumatic communication line. The operating principle is based on the transformation of hydrostatic pressure into pneumatic pressure by means of a power compensation system, the output being shown on the potentiometer. Its distinctive features are the high level of accuracy, with scales ranging from 1 m to 12 m, and the all-metal construction of the pneumatic system which ensures high sensor reliability and stability. (See also W74-11493) (Knapp-USGS)
W74-11505

FLOW MEASUREMENT OF SOME OF THE WORLD'S MAJOR RIVERS BY THE MOVING-BOAT METHOD,
Geological Survey, Washington, D.C.
G. F. Smoot.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication, No 99, Vol I, p 149-161, 1973. 5 fig, 5 tab, 3 ref.

Descriptors: *Flow measurement, *Stream gages, Instrumentation, Boats, Water measurement, Rivers, Current meters, Data collections, Hydrological data, Basic data collections, Discharge measurement, International hydrological decade.
Identifiers: Moving boat method.

A method for the rapid measurement of flows of large rivers and tidal reaches uses a moving boat. In this method, data are collected at a number of observation points while the observer is aboard a small boat that is rapidly traversing the cross-section. This technique is particularly useful at remote sites where no measuring facilities exist, during floods when facilities may be inundated or inaccessible, or at locations where unsteady flow conditions require rapid measurements. Flow measurements made at various sites using the moving-boat technique are summarized. Included are results obtained on two tidal reaches and such major rivers of the world as the Amazon, Mississippi, and Mekong. Where information is available, these measurements are compared with concurrent measurements obtained by conventional methods and agreement is generally within 5 percent. (See also W74-11493) (Knapp-USGS)
W74-11506

PROBLEMS IN THE DESIGN OF MEASURING STRUCTURES,
Research Inst. for Water Resources Development, Budapest (Hungary).
O. Starosolszky.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication, No 99, Vol I, p 162-168, 1973. 3 fig.

Descriptors: *Flow measurement, *Discharge measurement, *Stream gages, *Gaging stations, *Calibrations, Design, Duration curves, Weirs, Instrumentation, International hydrological decade.
Identifiers: Hungary.

Head-loss, operating costs of measurement, tailwater submergence and the mean error of water volumes determined on the basis of observed rates of flow are the major aspects required in the design of structures for continuous flow measurement. If the effect of submergence and the original rating curve of the channel are determined, the free-flow structure causing the smallest head-loss can be designed using the semigraphical method described. Submergence causes an error, the magnitude of which can also be estimated from the duration curves. The method is illustrated by an example. (See also W74-11493) (Knapp-USGS)
W74-11507

THE EVALUATION OF DISCHARGE MEASUREMENTS IN STREAMS WITH CHANGING FLOW CONDITIONS,
Board for Water Resources Management, Luneburg (West Germany).
K. Bellin.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 169-180, 1973. 7 fig.

Descriptors: *Flow measurement, *Discharge measurement, *Stage-discharge relations, *Hydrograph analysis, Backwater, Discharge coefficient, Hydrologic data, Water levels, Stream gages, Basic data collections, International hydrological decade.

Discharge is measured in streams with constantly changing flow conditions, but measurements are usually discontinuous. The discharge hydrograph for the time interval between two measurements is obtained from the stage hydrograph by means of the stage discharge curve. Widely scattered values obtained for the stage discharge relationship may be caused not only by weed conditions but also by moving sand, bank erosion or backwater. With the aid of the improved Gils method, an obstruction factor is derived from the fluctuations of the measured values which is representative of the water's discharge behavior at the time of measurement. A hydrograph describes the changes in discharge as caused by these changes during a discharge period. (See also W74-11493) (Knapp-USGS)
W74-11508

FLOW MEASUREMENT BY THE INTEGRATING FLOAT METHOD.
Missouri Univ., Columbia. Dept. of Civil Engineering.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 188-196, 1973. 1 fig, 14 ref.

Descriptors: *Flow measurement, *Discharge measurement, *Instrumentation, Streams, Velocity, Basic data collections, Hydrologic data, International hydrological decade.
Identifiers: Integrating float method.

A float released at the bottom of a stream may be used to determine the discharge of the stream. This method, the integrating float technique, gives discharges for any king of velocity profile. It is particularly suited for streamflow measurement at low velocities, but not limited to it. Other advantages include accuracy, simplicity, and the lack of need for calibrations. (See also W74-11493) (Knapp-USGS)
W74-11509

USE OF DEPTH FLOATS IN DRAINAGE CANALS WITH AQUATIC WEED,
Hydraulic Research Inst., Bratislava (Czechoslovakia).
J. Prochazka.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 197-205, 1973. 3 fig, 1 ref.

Descriptors: *Current meters, *Flow measurement, *Canals, Flow profiles, Discharge measurement, Water measurement, Velocity, Vegetation effects, International hydrological decade, Aquatic weeds.

Floats may be used to measure currents in irrigation canals. A theoretical analysis of the profile of water velocities in artificial irrigation canals is aimed at the whole cross-section as well as those parts which are accessible for using depth (bar) floats. They are usually the sections in the center of the trapezoidal profile and close to the water level due to the spread of weeds over the canal bed and banks during the growing period. Coefficients were developed for converting velocities recorded by means of floats to the mean profile velocity. A comparison of the results with measurements in the field is also presented. (See also W74-11493) (knapp-USGS)
W74-11510

MEASUREMENT OF DISCHARGE UNDER ICE COVER,
Water Survey of Canada, Winnipeg (Manitoba).
P. W. Strilaeff, and J. H. Wedel.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication, No 99, Vol I, p 214-227, 1973. 13 fig, 1 tab.

Descriptors: *Discharge measurement, *Ice cover, *Artic, Canada, Stream gages, Telemetry, Instrumentation, Data collections, Flow measurement, International hydrological decade.

A technique for estimation of river discharge using single velocity in a cross-section is proposed. Discharges derived using this technique and measured discharges using standard methods compare well. Discharge under ice may be computed on the basis of single velocity. To utilize the potential of this method fully, it is necessary to develop an instrument to be anchored firmly on the streambed to transmit velocities and possibly water levels and to develop an instrument to be installed on the river bank to receive and record velocities and water levels. (See also W74-11493) (Knapp-USGS)
W74-11511

ESTIMATION OF STREAMFLOW UNDER ICE COVER,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 2E.
W74-11512

TECHNIQUES FOR MEASUREMENT OF DISCHARGE BY DYE DILUTION,
Geological Survey, Washington, D.C.
H. H. Barnes, Jr., and F. A. Kilpatrick.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 251-259, 1973. 5 fig, 1 tab.

Descriptors: *Discharge measurement, *Dye dispersion, *Fluorescent dye, Dye releases, Water measurement, Stream gages, Gaging stations, Flow measurement, Instrumentation, Equipment, International hydrological decade.

Discharge measurements by dye-dilution were tested by the U.S. Geological survey for a wide variety of conditions to ascertain the suitability of the method for flow conditions where the current meter is not entirely adequate. The development of a reliable pneumatically-powered constant-rate injection apparatus and of stable fluorescent dyes measurable by fluorometers at concentrations of less than 0.1 microgram per liter enhances the constant-injection method of dilution gaging. This method is used extensively in gaging turbulent mountain streams, flow beneath ice, flow in shifting sand-channel streams, and in canals and manmade structures. (See also W74-11493) (Knapp-USGS)
W74-11513

STREAM HYDROGRAPHS BY FLUORESCENT TRACERS,
British Columbia Univ., Vancouver.
B. C. Goodell, and H. Steppuhn.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 260-270, 1973. 4 fig, 1 tab, 7 ref.

Descriptors: *Discharge measurement, *Dye dispersion, *Fluorescent dye, *Hydrographs, Water measurement, Stream gages, Gaging stations, Flow measurement, Instrumentation, Equipment, Dye releases, International hydrological decade.

A continuous stream-gaging system uses fluorescent tracers to produce stream hydrographs without the supplementary recording of stage. A tracer solution of known concentration is constantly injected at a known rate into the stream. Downstream, where the tracer is well mixed, sample flows are diverted through an automatic instrument which registers tracer concentrations on a gelatin-coated film. The exposed film is periodically gathered from stream sites, stored if necessary, and analysed in a laboratory-based fluorometer. Hydrographs resulting from 640 hours of gaging of two Colorado mountain streams with the system were compared with those obtained from closely located sharp-crested weirs. The maximum instataneous deviation between hydrographs reaches 10 percent and the average absolute departure equals 1.8 percent while algebraic departure averages +0.3 percent. (See also W74-11493) (Knapp-USGS)
W74-11514

CHEMICAL METHOD OF WATER FLOW MEASUREMENT IN OPEN CHANNELS,
State Inst. for Hydrology and Meteorology, Warsaw (Poland).
T. Czarnocki.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 271-278, 1973. 7 fig.

Descriptors: *Discharge measurement, *Tracers, *Colorimetry, Dye releases, Water measurement, Flow measurement, Stream gages, Open channel flow, International hydrological decade.
Identifiers: Chromates.

A chemical method for making discharge measurements is characterized by the fact that, with regular dosing of a tracer ($Na_2Cr_2O_7 \cdot 2H_2O$) the magnitude of constant concentration and the whole wave surface of the tracer are measured. In this way, two largely independent results are obtained. In practice, a group of three experienced workers can perform two measurements of discharge in an 8-hour day, including travel time by car up to 100 km. (See also W74-11493) (Knapp-USGS)
W74-11515

STREAM GAUGING WITH PORTABLE EQUIPMENT,
Research Council of Alberta, Edmonton.
R. Kellerhals, and M. Church.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 279-288, 1973. 8 fig, 8 ref.

Descriptors: *Stream gages, *Gaging stations, *Discharge measurement, Flow measurement, Instrumentation, Equipment, Data collections, Hydrologic data, Basic data collections, Dye releases, Dye dispersion, International hydrological decade.

Methods are described for the collection of short-period discharge records from steep streams with flows up to 100 cu m per sec. Excavation of a deep stilling well can often be avoided by locating the well some distance downstream from the measuring section. Connecting the well and stream through an inverted syphon also avoids trenching. The water level in wells with long, thin connections to the stream is linearly damped and can be converted to true stream level. Accurate discharges can be obtained by slug-injecting fluorescent tracers from volumetric pipettes or from prepared vials directly into the stream. At a downstream location where lateral mixing is assured, 10-20 samples should be collected during the passage of the tracer in order to determine the time-concentration curve, from which discharge can be computed. This method is particularly suitable for spot measurements during floods. (See also W74-11493) (Knapp-USGS)
W74-11516

PRECISION AND BIAS OF THE RESULTS OF DILUTION GAUGINGS,
Water Research Association, Marlow (England).
A. L. Wilson.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 289-299, 1973. 1 fig, 1 tab, 2 ref.

Descriptors: *Tracers, *Flow measurement, *Stream gages, *Solutes, Dispersion, Mixing, Water measurement, Data collections, Sampling, International hydrological decade.
Identifiers: Dilution gaging.

The effects of a number of sources of error on the precision and bias of results from dilution gagings are examined theoretically for the constant-rate-injection technique. From these considerations, recommendations are made for the precautions that should be observed to minimize the errors of the estimated discharges. Sites should be chosen so that complete mixing is obtained, and so that negligible losses or gains of the gaging ion occur. At least five samples of the stream should be taken from each of two sites over several hours in pairs corresponding to the same 'plug' of stream water. (See also W74-11493) (Knapp-USGS)
W74-11517

ADVERSE-BOTTOM-SLOPE WEIR AND ORIFICE,
Egyptian Desert Inst., Cairo.
M. I. Abaza.

In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 303-309, 1973. 4 fig, 5 ref.

Descriptors: *Weirs, *Discharge coefficient, *Stage-discharge relations, Flow measurement, Discharge measurement, Stream gages, International hydrological decade.
Identifiers: Adverse-bottom-slope weirs.

The boundary conditions of an adverse-bottom-slope weir and orifice differ from the standard conditions. The coefficients of discharge and their variations due to change in the adverse slope are discussed. In all cases of adverse-bottom-slope weir or orifice investigation, the discharge for the same head was higher than in the case of horizontal-slope weirs. The difference increases with increase of the slope and attains its maximum value at a slope around 2.5:1 for a weir and 4:1 for an orifice. The increase in the discharge coefficient obtained was 16% and 9% for adverse-bottom-slope weirs and orifices respectively. These results suggest the use of adverse-bottom-slope weir and gates instead of horizontal-bottom standard ones as they have a higher coefficient of discharge for the same head. (See also W74-11493) (Knapp-USGS)
W74-11518

LABORATORY CALIBRATION OF THE WALNUT GULCH SUPERCRITICAL FLOW-MEASURING FLUME,
Agricultural Research Service, Stillwater, Okla.
W. R. Gwinn.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 310-318, 1973. 11 fig, 1 tab.

Descriptors: *Flumes, *Flow measurement, *Stream gages, *Calibrations, Discharge measurement, Supercritical flow, Sediment load, Water measurement, Stage discharge relations, International hydrological decade.
Identifiers: *Supercritical flumes.

A new supercritical measuring flume is used to gage sediment-laden ephemeral flows in steep channels. The transition from the natural channel to the straight modified trapezoidal measuring section of the flume consists of a cylindroid surface. The flume is kept free of deposition by a V-shaped floor which slopes in the direction of flow. The head is measured at the midpoint of the straight section. Ten of these concrete flumes have been installed in the Walnut Gulch Watershed near Tombstone, Arizona. The largest has a bottom width of 36.6 meters and a capacity of about 740 cu m per sec. This structure is the largest known precalibrated flume now in operation. The design of the flumes, the laboratory calibration data and some observations of the field operation are discussed. (See also W74-11493) (Knapp-USGS)
W74-11519

FREE SURFACE SUBCRITICAL FLOW MEASUREMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
G. V. Skogerboe, and L. H. Austin.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 319-327, 1973. 4 fig, 9 ref. OWRT B-018-UTAH(5).

Descriptors: *Stage-discharge relations, *Stream gages, *Subcritical flow, *Pipe flow, *Urban hydrology, Storm runoff, Flow measurement, Water measurement, Discharge measurement, Flow around objects, International hydrological decade.

Analysis of submerged (subcritical) flow measurement at open channel constrictions can be applied to numerous types of side and overflow constrictions. A good example would be bridge constrictions with the so-called 'Abnormal Stage Condition', for which very little data are available. The techniques should be applied to the urban hydrology research program regarding free surface flow measurement at closed conduit constrictions. Stage-discharge ratings for open channel sections can be analyzed mathematically and experimentally for the effects of channel geometry and boundary resistance. Changes in the rating curve with time at a particular station could be related to changes in hydraulic characteristics of the channel. Also, the use of such techniques would provide a means of testing the accuracy of historical runoff records. (See also W74-11493) (Knapp-USGS)
W74-11520

FLOW OVER SIDE-WEIRS,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11521

GAUGING STATIONS ON SEDIMENT-LOADED MOUNTAIN RIVERS,
Swiss Federal Water Resources Bureau, Bern.
E. Walser.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 336-344, 1973. 5 fig.

Descriptors: *Stream gages, *Gaging stations, *Bed load, *Scour, *Supercritical flow, Stage-discharge relations, Flow measurement, Discharge measurement, Weirs, Flumes, International hydrological decade.
Identifiers: *Switzerland.

In a gaging station designed for streams with very large bed loads, the slope of the channel is such that the water flows with supercritical velocity. Sediment is not deposited at such velocities. For a given discharge, the water enters the channel at the same velocity as that at which it leaves the channel. Upstream of the upper end of the channel there is a weir so arranged that a scour hole is produced between this weir and the entrance of the channel. The entrance into the channel is not influenced by the changing approach velocities to the weir; it is only conditioned by the height of the water surface in the scour hole. This height depends on the discharge entering the channel, which, under steady conditions, is equal to the discharge arriving from upstream. The water leaves the channel forming a free nappe. Twelve stations in the Swiss network have been constructed on the basis of these ideas. They are working well. (See also W74-11493) (Knapp-USGS)
W74-11522

FLOW MEASUREMENT OF LOW-GRADIENT STREAMS IN SANDY SOILS,
Agricultural Research Service, Athens, Ga. Southeast Watershed Research Center.
P. Yates, and J. M. Sheridan.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 345-352, 1973. 1 fig, 5 ref.

Descriptors: *Stream gages, *Gaging stations, *Bed load, *Scour, *Supercritical flow, Stage-discharge relations, Flow measurement, Discharge measurement, Weirs, Flumes, *Georgia, International hydrological decade.
Identifiers: *Little River Experimental Watershed(Ga).

Design, construction, and maintenance details are described for submerged broad-crested V-notch weirs used for flow measurements in Little River Experimental Watershed near Tifton, Georgia. Weir rating techniques, including model studies and volumetric, pitot tube, and current meter methods for the prototypes, are presented. Methods are given for simultaneously recording upstream and downstream stages with digital-type recorders and subsequent development of rating equations for computing flow data which are used in watershed hydrologic analyses. Few satisfactory natural controls are found in the low-gradient streams of the Southern Coastal Plain, United States, and accurate discharge data are scarce. Artificial control difficulties involve backwater effects and lack of free overfall, dictating a compromise between weir submergence and ponding. Structure stability and scour protection cause special difficulties in the noncohesive soils of the region. (See also W74-11493) (Knapp-USGS)
W74-11523

MEASUREMENT AND ESTIMATION OF FLOOD DISCHARGES,
Geological Survey, Washington, D.C.
M. A. Benson.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 355-360, 1973. 1 tab, 12 ref.

Descriptors: *Stream gages, *Flow measurement, *Discharge measurement, *Floods, *Stage-discharge relations, Water levels, Basic data collections, Flow profiles, Rivers, Water measurement, International hydrological decade.

Flood discharge measurements may be made under extreme conditions by the use of specialized equipment or techniques. Measurement of large flows is exemplified by measurement of the Amazon, Mississippi, and Columbia Rivers. Large sounding weights are used; power equipment is used for sounding from boats, trucks, trailers, or powered cable cars. Special means may be used for stationing along a cross-section, as in the Amazon measurements. The optical velocity meter is a device which uses the stroboscopic effect for measuring the surface velocity of a stream. This method, in conjunction with an acoustic depth sounder, was used successfully to measure flows during recent extreme floods in California. Indirect measurements are a recourse on all sizes of streams when floods cannot be measured as they occur. Discharge is computed by post-peak measurements, through a reach of river (the slope-area method), through a bridge (the contracted-opening method), over dams, and through culverts. (See also W74-11493) (Knapp-USGS)
W74-11524

THE AIR-BUBBLE METHOD OF FLOW MEASUREMENT AND ITS APPLICATION,
National Water Authority, Budapest (Hungary).
L. J. David.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 361-373, 1973. 9 fig.

Descriptors: *Flow measurement, *Stream gages, *Bubbles, Instrumentation, Calibrations, Water measurement, Flow characteristics, Open channel flow, International hydrological decade.

The air-bubble method of flow measurement was designed for use in open channels. The rate of flow is obtained as the product of the area of the flow diagram and the terminal rising velocity of the bubbles, which can be considered constant under certain conditions. Laboratory and field measurements show that the terminal rising velocity of the cluster of bubbles is constant if the specified conditions of air injection are observed, and if it is greater in flowing than in standing water. The flow

diagram is recorded and determined by a photographic method. The mean error of measurement is estimated at 4 to 5 percent. (See also W74-11493) (Knapp-USGS)
W74-11525

DISCHARGE MEASUREMENT IN OPEN WATER BY MEANS OF MAGNETIC INDUCTION,
Hanover State Ministry for Food, Agriculture and Forests (West Germany).
H. Gils.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication, No 99, Vol I, p 374-381, 1973. 4 fig, 11 ref.

Descriptors: *Discharge measurement, *Hydrographs, Monitoring, Instrumentation, Flow measurement, Magnetic studies, Current meters, International hydrological decade.
Identifiers: *Magnetic induction.

A monitoring installation automatically measures open water discharge by magnetic induction and produces a discharge hydrograph. It is entirely without components impeding flow and the discharge cross-section is not constricted. The installation operates on a.c., 60 Hz. Soienoids produce a homogeneous magnetic field. In the water flowing through the magnetic field, a voltage is induced which is picked up by two electrodes. The installation measures water depth and mean velocity. Multiplied by the width of the water, these values give the discharge, which is instantaneously indicated and recorded in the form of a hydrograph through impulses once every 15 min. The measured values can be stored and automatically averaged to give mean daily and mean monthly discharges. (See also W74-11493) (Knapp-USGS)
W74-11526

ACCURACY AND RATIONALIZATION OF RIVER DISCHARGE MEASUREMENTS,
Godudarstvennyi Gidrologicheskii Institut, Lengingrad (USSR).
I. F. Karasev, and A. N. Chizhov.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 382-387, 1973. 1 tab.

Descriptors: *Discharge measurement, *Calibrations, *Current meters, Stream gages, Depth, Velocity, Flow measurement, Hydrologic data, Data collections, International hydrological decade.
Identifiers: USSR.

In measuring discharge by current meter, the errors of the method, both random and systematic, are of primary importance; the errors of depth and velocity measurements should be considered first of all. The error in velocity is due to turbulent pulsation of velocity and depends only slightly on the instrumental error. Areal averaging of depth and velocity from a series of verticals decreases the error of discharge measurements. It allows a small increase of error in velocity measurement without great increase in the error of discharge. It also permits reduction of the duration of current meter exposure at a given point, which in turn accelerates the discharge measurements. This averaging in space and time is most useful for the integration methods of discharge measurements, particularly for integration of velocities down the vertical. (See also W74-11493) (Knapp-USGS)
W74-11527

ULTRASONIC MEASUREMENT OF DISCHARGE IN RIVERS,
Public Works Research Inst., Tokoyo (Japan).
T. Kinosita.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 388-399, 1973. 9 fig.

Descriptors: *Flowmeters, *Radar, *Stream gages, Discharge measurement, Flow measurement, Water measurement, Instrumentation, Data collections, Hydrologic data, International hydrological decade.
Identifiers: *Japan.

Progress in improvement of ultrasonic flowmeters in Japan since 1964 is discussed. Data obtained by ultrasonic flowmeters are compared with those from rotating current meters; agreement is very good. The most significant merit of the ultrasonic flowmeter is that the lateral mean velocity can be obtained. (See also W74-11493) (Knapp-USGS)
W74-11528

MEASUREMENT OF DISCHARGE AS INFLOW INTO LEAKY RESERVOIRS,
Agricultural Research Service, Riesel, Tex.
W. G. Knisel, Jr.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 400-407, 1973. 6 fig, 4 ref.

Descriptors: *Water loss, *Reservoir leakage, *Flood control, *Karst hydrology, *Texas, Reservoirs, Water balance, Water measurement, Flow measurement, International hydrological decade.
Identifiers: *Edwards plateau(Tex).

Surface runoff is measured in leaky floodwater detention reservoirs in the Edwards Plateau near Sonora, Texas. The Edwards Plateau is a karst area in southwest Texas and the reservoirs are underlain by cavernous limestone. Losses from detention storage occur at variable rates throughout times of inflow and outflow. Estimates of loss rates are necessary to determine the total volumes of inflow. Reservoir stage loss rates can be determined from reservoir stage records when inflow is known to have ended. The loss rates can be applied throughout the stage record to estimate total inflow accurately. Loss rates estimated from the reservoir depletion record and used as an input into the computer with the time-stage record enables step-by-step computation to the time that inflow ends. Volume of losses determined from estimating equations agreed within 5% of the volume of losses computed by the conventional method of estimating loss rate in feet per hour from the stage record after inflow ended. (See also W74-11493) (Knapp-USGS)
W74-11529

A RECORDING METER FOR MEASURING THE OVERLAND FLOW,
Technische Universitaet, Dresden (East Germany). Dept. of Hydrology and Meteorology.
G. Peschke, and W. Krause.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 408-411, 1973. 2 fig.

Descriptors: *Overland flow, *Stream gages, *Instrumentation, Water measurement, Discharge measurement, Flow measurement, Data collections, Hydrologic data, International hydrological decade.

A system is described for determining the overland flow as a component of the streamflow in rivers. The apparatus enables continuous recordings of the overland flow intensity to be made within the range from 2 to 200 liters per hour. Water flowing off a runoff plot is collected in a trough and led to a recording meter. In the meter two measuring tanks are alternately filled by a tipping tray and emptied by a siphon. The water level changes in the tanks are recorded through floats by two pens on a drum. (See also W74-11493) (Knapp-USGS)
W74-11530

HYDRAULIC MODEL STUDY TO DETERMINE A STAGE-DISCHARGE RELATIONSHIP,
Snowy Mountains Hydro-Electric Authority, Cooma (Australia).
For primary bibliographic entry see Field 2E.
W74-11531

PROBLEMS OF FLOW MEASUREMENT IN LARGE RESERVOIRS,
Hydraulic Research Inst., Prague (Czechoslovakia).
J. Urban.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 423-431, 1973. 4 fig, 1 tab.

Descriptors: *Flow measurement, *Reservoirs, *Backwater, *Discharge measurement, Currents(Water), Streamflow, Flow profiles, Water levels, International hydrological decade.

The backwater effect of a high dam or of a series of dams can influence the flow in a very long reach of river. Direct measurement of the velocity of discharge in such streams is rather complicated; it can give good results only under simple conditions of flow through the reservoir. A simplified analysis of the longitudinal distribution of discharge in a reservoir is presented. If a tributary joins the main stream within the backwater reach, the rate of flow and the direction of flow in any cross-section depend on the inflow from the main stream and from the tributary, on the outflow from the reservoir and on the geometric and hydraulic characteristics of the reservoir. The analysis assumes that the temperature and density of water are homogeneous and that the changes in the inflow and outflow rates are slow enough to avoid formation of waves and secondary currents in the reservoir. (See also W74-11493) (Knapp-USGS)
W74-11532

LE (LEADING EDGE) FLOWMETER--A UNIQUE DEVICE FOR OPEN CHANNEL DISCHARGE MEASUREMENT,
H. Holmes, D. K. Whirlow, and L. G. Wright.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 432-443, 1973. 4 fig, 1 tab.

Descriptors: *Flowmeters, *Flow measurements, *Sonar, Discharge measurement, Water measurement, Gages, Stream gages, Equipment, Instrumentation, Calibrations, Current meters, International hydrological decade.

Leading edge (LE) acoustic flowmeters can measure open channel volumetric flow. Problems associated with the inhomogeneity of the medium were overcome, as evidenced by the successful operation of the LE flowmeter on various rivers and canals in the United States. Using the time differences resulting from transmitting signals between transducer pairs, average path velocities are calculated. Volume flow is computed by appropriately weighting the individual path velocities. Minimum resolvable flow, which is inversely proportional to path length, is about 0.2 m/sec for a 1 m path. For maximum accuracy, multiple paths are required. In channels with constant stage, flow is obtained by quadrature integration independent of the velocity profile. With variable stage, a water level sensor is also required. A typical flow with stage changes of plus 21% and minus 7% can be integrated to better than 1% accuracy. (See also W74-11493) (Knapp-USGS)
W74-11533

A CONSTANT DISCHARGE SIPHON FOR FLOW MEASUREMENT AND CONTROL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
B. C. Yen, and V. T. Chow.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 444-452, 1973. 3 fig, 3 ref. NSF Grant GK-11292.

Descriptors: *Flow measurement, *Water measurement, *Flow control, *Siphons, Stream gages, Instrumentation, Data collections, Discharge measurement, Gages, International hydrological decade.

A simple, inexpensive device consisting of a floating siphon system can be used both to discharge water from a container at a constant rate independent of the stage in the container and, simultaneously, to measure the variable rate of flow discharged into the container, provided the downstream water stage is low enough for the siphon to discharge water freely into the atmosphere. The device consists of hollow polyethylene boxes as the float and bent polyethylene tubes embedded in the boxes as the siphons. The total constant discharge of the siphon system can be varied by controlling the number of the siphons in operation and the siphon head. The float is connected to a stage recorder to obtain a discharge record. (See also W74-11493) (Knapp-USGS)
W74-11534

THE DEVELOPMENT AND PERFORMANCE OF A NEW HIGH ACCURACY HYDROGRAPHIC TELLUROMETER MODEL MRB 201,
Tellurometer, Ltd., Chessington (England).
J. d'Arcy.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 455-465, 1973. 2 fig, 1 tab, 2 append.

Descriptors: *Surveying instruments, *Hydrography, *Instrumentation, Measurement, Oceanography, Data collections, International hydrological decade.
Identifiers: *Tellurometers.

A new high accuracy (plus or minus 1 m) hydrographic Tellurometer is described. The techniques and special features of the equipment are discussed and the results of field trials conducted with the prototype are included. The instrument is designed to work up to a maximum rate of 30 knots. To enable the operator to take down readings manually at maximum speed, a button has been provided which holds the reading on the readout for as long as it is desired. (See also W74-11493) (Knapp-USGS)
W74-11535

MODERN POSITION FIXING METHODS,
Federal Board for Navigation, Coblenz (West Germany).
W. Lohrberg.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p466-476, 1973. 7 fig.

Descriptors: *Surveying instruments, *Hydrography, *Instrumentation, Measurement, Oceanography, Data collections, International hydrological decade.

Modern electronic position fixing methods are described and the prerequisite conditions for automatic recording and evaluation are shown. A precise knowledge of the morphology of the sea bottom or river beds is required. It is necessary both to increase the number of soundings and the precision of their positions and to evaluate the survey results faster. The aim must be to record survey data by electronic computers and plotters. Close co-operation between users and manufacturers has resulted in the development of recording and evaluation systems so that this ideal is now a reality. (See also W74-11493) (Knapp-USGS)
W74-11536

THE APPLICATION OF AN ORIENTATION SYSTEM FOR CONTINUOUS OBSERVATIONS FOR THE COMPILATION OF RIVER CHANNEL MAPS BY MEANS OF AN ECHO SOUNDER,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
N. S. Zubkov.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 477-480, 1973. 3 fig.

Descriptors: *Surveying instruments, *Hydrography, *Instrumentation, Measurement, Oceanography, *Data collections, International hydrological decade, Maps, Mapping.

A method is presented for the determination of the horizontal position of sounding points by the use of two angles of resection. The angles are estimated by the continuous observation of permanent shoremarks by means of three layout devices installed on the deck of the sounding vessel. Angles of resection are obtained by using a system comprising self-synchronizing sensors and differential self-synchronizers. The horizontal position of sounding points is fixed on the map on board the moving ship. The depths measured by the echo-sounder are recorded simultaneously. The time-lap between field and office work is eliminated. (See also W74-11493) (Knapp-USGS)
W74-11537

DIGITAL MEASUREMENTS OF RIVER BED PROFILES USING A GENERAL-PURPOSE DATA ACQUISITION SYSTEM,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
J. R. Glover, and D. D. Moran.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 483-490, 1973. 5 fig, 1 ref.

Descriptors: *Surveying instruments, *Hydrography, *Sounding, Instrumentation, Measurement, Oceanography, Data collections, International hydrological decade.

A computerized data acquisition system for measuring bed profiles is described. The system incorporates an IBM 1801 digital computer and Bludworth sounder which use a magnetic tape recorder and other components to provide punched cards with numbers representing the depth for each sounding. Interface hardware and programming techniques establish synchronization between the computer and sounder. (See also W74-11493) (Knapp-USGS)
W74-11538

THE MEASUREMENT OF MEAN TEMPERATURE ON A REACTION VELOCITY BASIS AND ITS APPLICATION TO HYDROLOGY,
Baden Wuerttemberg Hydrological Service, Karlsruhe (West Germany).
W. Schmitz.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 506-515, 1973. 4 fig, 6 ref.

Descriptors: *Water temperature, *Measurement, *Thermometers, *Hydrolysis, Monitoring, Instrumentation, Water quality, Water measurement, Thermal pollution, Data collections, International hydrological decade.
Identifiers: Germany, Polarimetry.

The dependence of the reaction velocity of sucrose hydrolysis on temperature may be used to estimate the temperature of the surroundings. The changes in concentrations of sucrose during the exposures, measured in a polarimeter, are the basis for calculations of average temperatures. The method is very reliable, so that it may be applied to many programs of measuring water temperatures, especially as influenced by cooling water discharges of power stations. The method is described, including details of the computer programs for data calculations. The results of temperature studies in the River Neckar, Germany are discussed. (See also W74-11493) (Knapp-USGS)
W74-11539

EXPERIENCES WITH PHOTOMETRIC TURBIDITY MEASUREMENTS,
Bayerischer Gewaesserkundedienst Staatlich, Munich, (West Germany).
J. Burz.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 519-530, 1973. 7 fig, 2 tab, 12 ref.

Descriptors: *Turbidity, *Suspended load, *Photometry, Measurement, Instrumentation, Light penetration, Optical properties, Water quality, Monitoring, Calibrations, Data collections, International hydrological decade.

Sediment measurements were carried out in Bavarian rivers using two turbidimeters (Sigrist photometer and Askania turbidimeter). In the course of these tests special emphasis was placed on reliability in operation, maintenance, expenditures, and calibration. Almost each sample of suspended sediment, as well as each particle size range of the same sample, results in a different calibration curve. Thus the calibration is ambiguous, especially since the granularity and composition of suspended sediments may vary within the same water. Light transmitting capacity and light scatter depend not only on the concentration of the suspended material, but also on the size, color, reflection and absorption capacity of the particles. In colored water, the coloration causes considerable errors in absorption measurements. Turbidity and coloration have the same effect and thus confound any conclusion related to the individual components. (See also W74-11493) (Knapp-USGS)
W74-11540

A METHOD FOR MEASURING THE QUALITY OF BEDLOAD TRANSPORTED BY SHORT FLOOD WAVES,
Bulgarian Academy of Sciences, Sofia. Inst. of Water Problems.
B. V. Georgiev, and R. D. Papazov.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 531-537, 1973. 4 fig, 1 tab.

Descriptors: *Sampling, *Bed load, Sedimentation, Sedimentology, Sediment load, Sediment transport, Flood waves, Floods, Peak discharge, Data collections, International hydrological decade.
Identifiers: *Sediment traps.

Sediment traps installed in the river bed are used for the strip method of measuring bedload during floods. The size and form of the sediment traps were determined by experiments in the laboratory and in the field. The traps are designed to retain all material caught in them. The method provides the mean bedload discharge, its distribution in the cross-section, and the total mass of bedload transported by the flood wave. Conventional sampling measurement of bedload during the passage of floodwaves, when the most rapid movement of

bedload is taking place, is not always possible because of the high velocities experienced. (See also W74-11493) (Knapp-USGS)
W74-11541

BEDLOAD MEASUREMENT BY MEANS OF BOTTOM PLATES AND BEDLOAD SAMPLERS WITH HYDROPHONE ATTACHMENTS,
Bundesanstalt fuer Gewasserkunde, Coblenz (West Germany).
H. Hinrich.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 544-551, 1973. 4 fig.

Descriptors: *Bed load, *Sampling, *Measurement, *Acoustics, Sediment transport, Sedimentation, Sedimentology, Instrumentation, Data collections, International hydrological decade.

A sampler was developed recently to simultaneously measure the quantity of bedload transport and observe it acoustically. For this purpose, a bedload sampler was fitted with an underwater microphone, the sound transmitter of which is connected, via an amplifier, to a headset and a loudspeaker. The measurements can show the irregularities in bedload transport caused during the passing of a ship, in particular during the so-called critical runoff phase. (See also W74-11493) (Knapp-USGS)
W74-11543

FIELD STUDIES OF SEDIMENT MOVEMENT USING FLUORESCENT TRACERS,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W74-11544

INSTRUMENTATION CONSIDERATIONS FOR STUDIES OF QUALITY OF RUNOFF FROM SMALL AGRICULTURAL WATERSHEDS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
W. M. Edwards, and L. L. Harrold.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 575-581, 1973. 3 fig, 9 ref.

Descriptors: *Water quality, *Instrumentation, *Monitoring, *Sampling, *Small watersheds, Data collections, Telemetry, Water analysis, Water pollution sources, Farm wastes, Fertilizers, International hydrological decade.

Evaluating water quality on small agricultural basins is directed toward relating pollution to manageable or predictable factors. Continuous monitoring and telemetering is limited to a few parameters and to continuously flowing streams. Discrete samples must be collected when surface runoff from individually treated fields and intermittent flowing watersheds is to be studied. The sampling program must be determined by the specific goals of research. Sample size, frequency, storage, preparation for analysis, analysis, and interpretation must be carefully planned to ensure interpretable results. Devices that automatically take several samples, refrigerate them, and indicate on a hydrograph the exact time and flow rate are described. Merits of various flow sensors, intakes, distribution systems, containers, and event recorders are discussed. (See also W74-11493) (Knapp-USGS)
W74-11545

DETERMINATION OF THE BOD5 IN RUNNING WATERS BY MEANS OF BIOLOGICAL WATER ANALYSIS,
Rheinland-Pfalz, Hydrological Service, Mainz (West Germany).
For primary bibliographic entry see Field 5A.
W74-11546

MEASUREMENT AND SIGNIFICANCE OF ELECTRICAL CONDUCTIVITY IN SMALL MOUNTAIN STREAMS,
Swiss Forest Research Inst., Birmensdorf.
H. M. Keller.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 588-595, 1973. 3 fig, 2 tab, 9 ref.

Descriptors: *Water quality, *Discharge(Water), *Electrical conductance, Runoff, Conductivity, Streamflow, Forests, Alpine, Sampling, Data collections, Water chemistry, International hydrological decade.
Identifiers: *Switzerland.

Five small catchments in the Prealps of Switzerland were investigated over two years (1967-68) to establish relationships between discharge and water quality characteristics. Forests cover between 38 and 92 percent, and swampy areas between 4 and 40 percent. Their exposure varies between E and WNW. The electrical conductivity at 20 deg C, as measured with a plastic conductivity cell shows marked negative correlation with discharge rates as determined with the salt dilution method. Assuming similar annual flow regime, the regression of electrical conductivity on discharge may be used to estimate average surface runoff conditions in these catchments. (See also W74-11493) (Knapp-USGS)
W74-11547

PRACTICAL EXPERIENCE WITH DEVICES TO MEASURE O2 CONTENT, TURBIDITY, SOLID MATTER CONTENT AND ELECTRICAL CONDUCTIVITY USED FOR MONITORING WATER QUALITY IN RIVERS,
Emschergenossenschaft, Essen (West Germany).
For primary bibliographic entry see Field 5A.
W74-11548

THE COLORIMETRIC FRONT-END SENSORS IN AUTOMATIC SURVEILLANCE OF WATER QUALITY,
Automated Environmental Systems, Inc., Woodbury, N.Y.
For primary bibliographic entry see Field 5A.
W74-11549

DEUTERIUM AND OXYGEN-18 MEASUREMENTS ON SURFACE WATERS OF THE BAVARIAN PREALPS,
Gesellschaft fuer Strahlenforschung m.b.H., Munich (West Germany). Institut fuer Radiohydrometrie.
For primary bibliographic entry see Field 2K.
W74-11550

SPECIAL HYDROMETRIC SHIPS FOR THE INLAND WATERWAYS OF THE FEDERAL REPUBLIC OF GERMANY,
Bundesanstalt fuer Gewasserkunde, Coblenz (West Germany).
H. Jansen, and J. Sindern.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 639-647, 1973. 2 fig.

Descriptors: *Ships, *Water measurement, *Discharge measurement, Hydrometry, Bed load, Sampling, Current meters, Sounding, Discharge(Water), Flow measurement, Suspended load, Instrumentation, Sediment load, International hydrological decade.
Identifiers: *Germany.

Ships are used for hydrometric work on the inland waterways of the Federal Republic of Germany, in particular for the measurement of current speed, discharge, and bedload and suspended sediment transport. Water depth below the ship or above an area is sounded and graphically recorded with the aid of echo sounders, radiologs, depth recorders and bank distance sounders (horizontal sounders). Cross-sections are either reproduced immediately to scale, or recorded on punched tape for evaluation by computer and printing to a desired scale by plotter. (See also W74-11493) (Knapp-USGS)
W74-11551

TEMPERATURE MEASUREMENTS OF WATER SURFACES USING INFRA-RED RADIATION THERMOMETERS,
Deutscher Wetterdienst, Hohenpeissenberg (West Germany).
D. Lorenz.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 651-667, 1973. 13 fig, 3 tab, 18 ref.

Descriptors: *Remote sensing, *Infrared radiation, *Water temperature, Aircraft, Data collections, Instrumentation, Solar radiation, Thermometers, International hydrological decade.
Identifiers: *Radiometers.

In infrared radiation thermometers used in meteorology and hydrology, a narrow bandpass, from 9.5 to 11.5 micrometers is convenient for the temperature measurements of water surfaces. A radiometer with this narrow bandpass was tested in an aircraft flying over water. Airborne measurements of a reservoir were made along the 8 flight paths within a quater of an hour. The PRT 6 was used with filter A (9.5 to 11.5 micrometers). The flight level was 90 m above the water surface so that the target area was about 5m x 5m. The results showed which parts of the reservoir were ice covered. Furthermore, it was possible to plot the isotherms of the water surface temperature. The highest temperatures along the longitudinal axis of the lake are close to the former riverbed. Because of the heavy turbulence of the water near the inlet of the electric plant, the surface temperature was almost the same as in the river. (See also W74-11493) (Knapp-USGS)
W74-11552

EARTH SATELLITES AND THEIR APPLICATIONS IN HYDROMETRY AND HYDROLOGY,
National Environmental Satellite Center, Suitland, Md.
E. P. McClain, and D. R. Baker.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 668-677, 1973. 3 fig, 7 ref.

Descriptors: *Satellites(Artificial), *Remote sensing, *Telemetry, Data collections, Hydrologic data, Infrared radiation, Instrumentation, Surveys, Hydrology, Hydrometry, International hydrological decade.

Earth satellites can be used for operations or research in hydrometry and hydrology as a platform for remote sensors and as a data relay device. The types of orbits generally the most useful are sun-synchronous, which are relatively low altitude and near-polar inclination; and earth-synchronous, which are relatively high and near-equatorial. The types of remote sensing equipment that are available or under development range across the electromagnetic spectrum from microwave through infrared and visible frequencies. There have already been limited applications of visible and infrared data from meteorological satellites to hydrologic and related problems. Equipment is being developed that will enable analog or digital output from hydrometric or hydrologic observation systems at the ground to be relayed via satellite to central data processing centers. (See also W74-11493) (Knapp-USGS)
W74-11553

MEASURING DEVICES IN STATIONARY AND MOBILE CONTROL STATIONS FOR THE SUPERVISION OF RIVERS, SHOWN BY THE EXAMPLE OF THE LIPPE AND EMSCHER RIVERS,
Emschergenossenschaft, Essen (West Germany).
E. Knop.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 705-716, 1973. 15 fig.

Descriptors: *Monitoring, *Water pollution control, *Water quality, Rivers, Dissolved oxygen, Water temperature, Conductivity, Turbidity, Sediment load, International hydrological decade.
Identifiers: *Germany(Lippe River), *Germany(Emscher River).

A network of coordinated data and control stations on the Lippe and Emscher Rivers of Germany is discussed and modern instrumentation for stationary and mobile control stations which has proved efficient in the past is reviewed. At control stations, the essential properties of the water are continuously recorded. The control stations are also equipped with fish tanks through which river water, waste water, or a known mixture of waste water with dechlorinated mains water or river water constantly flows. The main advantage of this very simple fish test is that it covers the superimposition of toxic effects which cannot always be determined from the specific, continuously measured or laboratory concentrations of the various load components. If the fish show adverse effects, stored samples are available to discover the reasons for damage. Automatic measuring devices determine specific properties and load factors of the water. Oxygen content, water temperature, air temperature, conductivity, pH, turbidity, and structure of solid matter are monitored. (See also W74-11493) (Knapp-USGS)
W74-11554

HYDRA II--AUTOMATIC DIGITAL TELEMETERING SYSTEM,
Research Inst. for Water Resources Development, Budapest (Hungary).
T. Puskas, and H. Karsai.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 717-721, 1973. 1 fig.

Descriptors: *Telemetry, *Water measurement, *Monitoring, Instrumentation, Precipitation gages, Water levels, Gaging stations, Data collections, Data transmission, Data processing, Hydrologic data, International hydrological decade.
Identifiers: *Hungary.

A telemetering system used in Hungary was designed to transmit, collected, record and evaluate hydrological information and to issue signals or orders. Its working radius is about 50 km. At present it is capable of collecting precipitation and water level information. The information is recorded in decimal units on a paper tape. A signal is produced when a critical instantaneous value is attained or exceeded or a change in value occurs. It can be operated either automatically or manually when required. Thirty-two stations can be connected to a center, and at the same time three digital and six analog sensors can be connected to a station. (See also W74-11493) (Knapp-USGS)
W74-11555

WATER-QUALITY MONITORING AND DATA TRANSMISSION,
Geological Survey, Washington, D.C.
G. F. Smoot.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 722-729, 1973. 2 fig, 3 ref.

Descriptors: *Monitoring, *Water quality, *Data transmission, Instrumentation, Equipment, Training, Hydrologic data, Data collections, Sampling, International hydrological decade.

The evolution of automatic water-quality monitoring within the Water Resources Division of the U.S. Geological Survey is briefly reviewed, and the automated water-quality monitoring system now in use by the Geological Survey is described. The description includes all principal components from the sampling technique to the computer-processed data compilation. A description of the digital telemetry system most frequently used by the Geological Survey is also included. The experience gained from operating a nationwide network for a number of years and the procedures and techniques pertaining to training of field personnel, construction of onsite facilities, calibration of sensors, establishing maintenance schedules, and processing of data are discussed. (See also W74-11493) (Knapp-USGS)
W74-11556

RADIO CONTROL OF WATER LEVEL GAUGES IN WATERCOURSES ENDANGERED BY HIGH WATER LEVELS,
Emschergenossenschaft, Essen (West Germany).
V. Stalmann.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 730-736, 1973. 4 fig.

Descriptors: *Telemetry, *Water levels, *Floods, *Warning systems, Stage-discharge relations, Gaging stations, Stream gages, Data transmission, Hydrologic data, Flow measurement, International hydrological decade.
Identifiers: *Germany(Emscher River), *Germany(Lippe River).

Telemetry of stage data is used in regulated watercourses operated for decades by Emschergonossenschaft and Lippeverband in Germany. High water levels can develop within a very short amount of time and with only a very little time lag after rainfall, especially in small catchments covering areas of only a few square kilometers. In order to avert damage and danger, it is indispensable to have information as early as possible on the different water levels at important points. Numerous flow measuring posts established by the two associations are susceptible to defects and disturbances, are slow in operation, and are rather expensive to operate and maintain. Therefore, Emschergenossenschaft and Lippeverband developed, in cooperation with AEG Telefunken, a system for the radio transmission of water levels to a central control station. Tests show that this teletransmission system has good recording accuracy. The costs of such a system are lower than those for telephone transmission of water levels. Several of the new radio transmission flow measuring posts started operation in 1970. (See also W74-11493) (Knapp-USGS)
W74-11557

A COMPUTER AUTOMATED SYSTEM FOR HYDROLOGIC DATA ACQUISITION AND ANALYSES,
Arizona Univ., Tucson. Dept. of Watershed Management.
J. L. Thames, and R. M. Tinlin.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 737-746, 1973. 3 fig, 1 tab.

Descriptors: *Telemetry, *Automation, *Data transmission, *Data processing, *Arizona, Training, Monitoring, Data collections, Hydrologic data, Water measurement, Digital computers, Forests, Deserts, International hydrological decade.

An interfaced hydrologic data acquisition and processing system was installed at the University of Arizona. A forested mountain watershed and a desert watershed area within a 50 km radius of the campus were instrumented for measuring a variety of hydrologic and climatic variables. Measurement data are both multiplexed over the telephone system and transmitted by radio. Measurements on the desert watershed may be programmed in any sequence and sampling rate varied from seconds to 24-hr intervals automatically or according to the rate at which input signals may change. Operation of the system is automated from a central laboratory by a small computer. Reference information, preliminary data reduction programs, and control data may be entered into the system. All output is recorded on magnetic tape, but may also be displayed on strip charts or teleprinter. The facility provides input-output data for research in synthesizing the hydrologic behavior of watersheds. It also offers a unique means of teaching principles of hydrologic processes, methods of data acquisition, and procedures in hydrologic analyses. (See also W74-11493) (Knapp-USGS)
W74-11558

RECORDING AND TELETRANSMISSION OF MEASURED DATA IN HYDROLOGY AND RELEVANT WMO ACTIVITIES,
E. Walser.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 753-757, 1973.

Descriptors: *Telemetry, *Data collections, *Hydrologic data, Automation, Meteorological data, Data transmission, Data processing, Instrumentation, Water measurement, International hydrological decade.

Instruments and methods of observation used by the World Meteorological Organization Commission for Hydrometeorology are reviewed. Automatic equipment is used for observing and transmitting hydrometeorological elements. The scope of this work, including the description and evaluation of automatic sensors, teletransmitting and automatic processing equipment, is described. While particular emphasis is placed on elements connected with hydrometry, other hydrological elements are also considered. Concise general information on WMO activities in the whole field of automatic collection, teletransmission and processing of data is given. (See also W74-11493) (Knapp-USGS)
W74-11559

ERRORS IN MEASUREMENT OF FLOW BY VELOCITY AREA METHODS,
Waterloopkundig Laboratoriu, Delft (Netherlands).
H. Botma, and A. J. Struyk.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 771-784, 1973. 6 fig, 5 tab, 2 ref.

Descriptors: *Flow measurement, *Current meters, *Data collections, *Statistics, Flowmeters, Stream gages, Water measurement, Hydrologic data, International hydrological decade.
Identifiers: Error analysis.

Routine measurements of flow in open channels, carried out using current meters and applying the velocity area method, do not give sufficient information to estimate the accuracy of the method. In order to determine the magnitude of the errors much more detailed measurements are needed. Errors are caused by using a finite time to measure the local point velocities, using a finite number of points per vertical, and using a finite number of verticals. The mean error is always negative. Various methods of choosing verticals do not give very

different results. But using only a very few verticals, the more information used in choosing the verticals, the better the result. The number of verticals appears to have the most influence on total error, which is not surprising if the form of the cross-section is taken into account. (See also W74-11493) (Knapp-USGS)
W74-11560

THE CRITERION OF INFORMATION SUFFICIENCY WITH AUTOMATION OF HYDROLOGICAL MEASUREMENTS,
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
A. M. Dimaksian.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 785-792, 1973. 3 fig, 1 tab, 3 ref.

Descriptors: *Water measurement, *Statistics, *Network design, *Data collections, *Hydrologic data, Gaging, Gaging stations, International hydrological decade.
Identifiers: USSR.

Hydrological investigations involve study of a continuous process using a series of discrete values. The amount of information required to represent the process to a required accuracy must be determined. A method to calculate the optimum number of measurements for a given accuracy is presented. Error distribution curves show that the accuracy and the frequency of measurements are related by an exponential function. On the basis of these curves, the efficiency of hydrometric measurements may be determined, and a superfluous complexity of automatic measuring devices may be avoided. (See also W74-11493) (Knapp-USGS)
W74-11561

DEVELOPMENTS IN THE PROCESSING OF HYDROLOGICAL DATA IN AUSTRALIA,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Research.
For primary bibliographic entry see Field 7C.
W74-11562

METHODS AND MEANS FOR PREPARING HYDROLOGICAL OBSERVATION RESULTS FOR PROCESSING ON COMPUTERS,
Scientific Research Inst. of Aeroclimatology, Moscow (USSR).
For primary bibliographic entry see Field 7C.
W74-11563

ANALOGUE TO DIGITAL CONVERSION AND DATA ACQUISITION FROM CHARTS OF WATER LEVEL AND RAINFALL RECORDERS AND THEIR EVALUATION BY A COMPUTER,
Ruhrtalsperrenverein, Essen (West Germany).
For primary bibliographic entry see Field 7C.
W74-11564

MANUAL AND AUTOMATIC EVALUATION OF HYDROMETRIC DATA IN ISRAEL,
Ministry of Agriculture, Jerusalem (Israel). Hydrological Service.
For primary bibliographic entry see Field 7C.
W74-11565

EXPERIENCES WITH A FULLY AUTOMATIC CURVE SCANNER,
Bundesanstalt fuer Gewasserkunde, Coblenz (West Germany).
For primary bibliographic entry see Field 7C.
W74-11566

THE INTENSE EVALUATION OF DISCHARGE MEASUREMENTS BY THE EQUATIONS OF THE UNIVERSAL VELOCITY DISTRIBUTION LAW,
Bayerischer Gewaesserkundedienst Staatlich Byaerische, Munich (West Germany).
For primary bibliographic entry see Field 2E.
W74-11567

THE TRACE ANALYSIS OF WATER FOR SELECTED METALLIC ELEMENTS EMPLOYING SQUARE-WAVE POLAROGRAPHY,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 5A.
W74-11679

REPORT ON A NEW UNDERWAY SEDIMENT SAMPLER,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 2J.
W74-11726

UTILIZATION OF REMOTELY-SENSED DATA IN THE MANAGEMENT OF INLAND WETLANDS,
Geological Survey, Washington, D.C.
V. Carter, and D. G. Smith.
Available from the National Technical Information Service, Springfield, Va 22161, as N73-33314, Price $3.00 printed copy; $2.25 microfiche. Contract Report for NASA, 1973. 14 p, 9 fig, 10 ref. NASA Contracts NAS 5-21752 and NAS272.

Descriptors: *Remote sensing, *Water management(Applied), *Land management, *Wetlands, Water levels, Hydrologic data, Data collections, Water balance, Mapping, Florida, Virginia.

Remote sensing provides a powerful tool to meet critical management needs for inventory and classification of inland wetlands as well as for evaluation of the wetland role in the hydrologic cycle, identification of significant wetlands for wildlife preservation, and monitoring of wetland change. Remotely-sensed data are being utilized for wetland management in the Dismal Swamp (Virginia-North Carolina) and in wetlands of central and southern Florida. High altitude photography aircraft can be used for gross vegetation mapping, boundary determination, and selection of sites for intensive study. Low altitude photography is useful for more detailed mapping. Black and white orthophoto quadrangles currently under preliminary stages of preparation in the U.S. Geological Survey will provide up-to-date maps of the swamp at 1:24,000 scale. ERTS (Earth Resources Technology Satellite) provides the big picture--the entire Swamp is visible on one ERTS frame--and permits observation of seasonal change and monitoring of significant ecological shifts. In southern Florida, ERTS provides information for water management in the wetlands north and south of Lake Okeechobee where droughts place significant demands on water that is also needed for maintenance of the Everglades National Park. Water level and precipitation data are collected in near real time by the DCS (Data Collection System). These data are correlated with ERTS imagery that portrays the areal extent of standing water for prediction and management of water flow. (Knapp-USGS)
W74-11727

STUDIES OF THE INNER SHELF AND COASTAL SEDIMENTATION ENVIRONMENT OF THE BEAUFORT SEA FROM ERTS-1,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W74-11728

EXTRACTING LAND USE INFORMATION FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE DATA BY CONVENTIONAL INTERPRETATION METHODS,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
P. L. Vegas.
Available from the National Technical Information Service, Springfield, Va 22161, as NASA TN D-7730, Price $3.75 printed copy; $2.25 microfiche. National Aeronautics and Space Administration Technical Note D-7730, July 1974. 54 p, 16 fig, 6 tab, 2 ref, 2 append.

Descriptors: *Land use, *Remote sensing, *Satellites(Artificial), Terrain analysis, Photogrammetry, Mapping, Surveys, *Mississippi.
Identifiers: Harrison County(MS).

Land use data can be extracted from a single frame of Earth Resources Technology Satellite imagery by using various scales and bands when limited to general ground truth and to conventional photointerpretation methods and equipment. More data can be obtained from the imagery by using sequential seasonal frames and more detailed ground truth and by making better use of individual bands and scales as a result of earlier experience. During the experiment, a procedure was developed for extracting selected data from available satellite imagery in a simple and cost-effective manner, with equipment and personnel available at local levels. Harrison County, Mississippi, having a land area of 1515 square kilometers and a population of 132,000 was chosen for the study. For more detailed land use delineation, townships 5, 6, and 7 south in range 10 west in Harrison County were selected. Multispectral scanner imagery in four bands covering the range of wavelengths from 0.5 to 1.1 micrometers was used. The 1:1,000,000-scale transparent film imagery of band 5 was enlarged to scales of 1:250,000, 1:120,000, 1:62,500, and 1:24,000, and the best color composite combination of bands 4, 5, and 7 was enlarged to scales of 1:250,000 and 1:120,000 for interpretation. After a thorough evaluation, the 1:24,000 scale was abandoned as being too vague in resolution for land use purposes or for use as a map base. (Knapp-USGS)
W74-11729

APPLICATION OF REMOTE SENSING IN THE STUDY OF VEGETATION AND SOILS IN IDAHO,
Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
For primary bibliographic entry see Field 4A.
W74-11738

EVAPORIMETRY IN THE CANAL ZONE: PART II, COMPARISON OF VARIOUS TYPES OF EVAPORIMETERS ON AN HOURLY BASIS,
Army Tropic Test Center, APO New York 09827.
For primary bibliographic entry see Field 2D.
W74-11740

WASTEWATER SAMPLING AND TESTING INSTRUMENTATION,
Georgia Inst. of Tech., Atlanta.
For primary bibliographic entry see Field 5A.
W74-11754

DETECTION OF SUBSURFACE CAVITIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 4B.
W74-11756

WELL MEASUREMENTS,
Ministry of Works, Wellington (New Zealand).
For primary bibliographic entry see Field 4B.
W74-11760

GEOPHYSICAL METHODS IN GEOTHERMAL EXPLORATION,
For primary bibliographic entry see Field 4B.
W74-11762

ICE DEVELOPMENT ON LAKE CHAMPLAIN,
Vermont Univ., Burlington. Dept. of Geography.
For primary bibliographic entry see Field 2H.
W74-11772

DYNAMICS OF PLAYA LAKES IN THE TEXAS HIGH PLAINS,
Texas Tech Univ., Lubbock. Remote Sensing Lab.
C. C. Reeves, Jr.
Available from NTIS, Springfield, Va. 22161 as N73-33259 Price $3.00 printed copy; $2.25 microfiche. Progress Report for April-September 1973 to Goddard Space Flight Center 1973. 6 p. NASA Contract NAS 5-21720.

Descriptors: *Remote sensing, *Satellites(Artificial), *Playas, *Surveys, *Water balance, *Ecology, Weather data, Water levels, Lakes, Cost-benefit analysis, Texas, Data collections, Data processing.
Identifiers: *ERTS.

ERTS-1 satellite imagery signatures of the water balance ecosystem and geology of select playa lake basins in West Texas were studied at the Double Lakes test site in Lynn County, Texas, and ground-truth of three other small playas was determined. The principal work during the report period consisted of monitoring the weather instruments, the measurement of water levels and water depths, examination of MSS imagery, and measurement of water and mud areas by use of ESIAC (Electronic Satellite Image Analysis Console) at Stanford Research Center, Menlo Park, California. A cost/benefit analysis, comparing the use of ERTS-1 data to more conventionally secured data, revealed that use of ERTS-1 data for such a survey results in a cost reduction from $2.00 to $0.03/square mile. (Knapp-USGS)
W74-11774

APPLICATION OF THERMAL IMAGERY TO THE DEVELOPMENT OF A GREAT LAKES ICE INFORMATION SYSTEM,
National Aeronatucs and Space Administration, Cleveland, Ohio. Lewis Research Center.
R. J. Schertler, C. A. Raquet, and R. A. Svehla.
Available from NTIS, Springfield, Va. 22161 as N74-11205 Price $3.00 printed copy; $2.25 microfiche. In: Interdisciplinary Symposium on Advanced Concepts and Techniques in the Study of Snow and Ice Resources, December 2-6, 1973, Monterey, Calif: National Aeronautics and Space Administration Technical Memorandum X-71478, p 5.8-1--5.8-10, 1973. 4 fig, 4 ref.

Descriptors: *Ice, *Sea ice, *Remote sensing, *Infrared radiation, Surveys, Mapping, Data collections, Radar, Microwaves, Temperature, Water temperature, Ice cover, Great Lakes.

Thermal infrared imagery can be used to delineate the relative thicknesses of various regions of freshwater ice, as well as to differentiate new ice from both open water areas and thicker (young) ice. Thermal imagery is generally superior to visual and SLAR imagery for estimating relative ice thicknesses and delineating open water from new ice growth. In a real-time Great Lakes Ice Information System, thermal imagery provide supplementary imagery and also aids in developing interpretative methods for all-weather SLAR imagery. (Knapp-USGS)
W74-11784

STUDIES ON RUNOFF CHARACTERISTICS IN CHANNEL NETWORK SYSTEMS IN LOW LAND,
For primary bibliographic entry see Field 2A.
W74-11865

SOIL-WATER REGIMES IN BROOKSTON AND CROSBY SOILS,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-11899

THE USES OF GEOPHYSICAL METHODS IN HYDROGEOLOGICAL INVESTIGATIONS IN ISRAEL,
Geological Survey of Israel, Jerusalem.
For primary bibliographic entry see Field 2F.
W74-11906

EVAPORATION LOSSES FROM CONTAINERS OF HELLMANN PRECIPITATION GAUGES,
Eidgenoessische Technische Hochschule, Zurich (Switzerland).
For primary bibliographic entry see Field 2B.
W74-11909

REMOTE SENSING STUDY OF LAND USE AND SEDIMENTATION IN THE ROSS BARNETT RESERVOIR, JACKSON, MISSISSIPPI, AREA,
University of Southern Mississippi, Hattiesburg.
For primary bibliographic entry see Field 4A.
W74-11963

GENERALIZATION OF STREAM TRAVEL RATES AND DISPERSION CHARACTERISTICS FROM TIME-OF-TRAVEL MEASUREMENTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2E.
W74-11971

AMMONIUM ION SPECIFIC ELECTRODE,
Department of Health, Education, and Welfare, Bethesda, Md.
For primary bibliographic entry see Field 2K.
W74-11984

APPLICATION OF SURFACE GEOPHYSICS TO GROUNDWATER INVESTIGATIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-11996

7C. Evaluation, Processing and Publication

HYDROGEOLOGY OF THE USSR. VOLUME 4: VORONEZH, KURSK, BELGOROD, BRYANSK, ORLOV, LIPETSK, AND TAMBOV OBLASTS (GIDROGEOLOGIYA SSSR. TOM IV. VORONEZHSKAYA, KURSKAYA, BELGORODSKAYA, BRYANSKAYA, ORLOVSKAYA, LIPETSKAYA, TAMBOVSKAYA OBLASTI).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
For primary bibliographic entry see Field 4B.
W74-11453

HYDROGEOLOGY OF THE USSR. VOLUME 17: KEMEROVO OBLAST AND ALTAY TERRITORY (GIDROGEOLOGIYA SSSR. TOM XVII. KEMEROVSKAYA OBLAST' I ALTAYSKIY KRAY).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
For primary bibliographic entry see Field 4B.
W74-11454

HYDROGEOLOGY OF THE USSR. VOLUME 26. SOVIET NORTH EAST (GIDROGEOLOGIYA SSSR. TOM XXVI. SEVERO-VOSTOK).
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow (USSR).
For primary bibliographic entry see Field 4B.
W74-11455

METHODS OF FLOOD FLOW DETERMINATION IN SPARSE DATA REGIONS,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 4A.
W74-11458

A DIVERSITY INDICES COMPUTER PROGRAM FOR USE IN AQUATIC SYSTEMS EVALUATION,
West Virginia Univ., Morgantown. Water Research Inst.
E. C. Keller, Jr., and J. A. Silvester.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 259; $3.00 in paper copy, $2.25 in microfiche. Information Report 3, (WRI-WVU-74-01), 1974. 15 p, 17p. OWRTB-001-WVA(5). 14-31-0001-3351.

Descriptors: *Computer programs, Ecology, *Simulation analysis, Water pollution, Water quality, Statistical models, Ecosystems.
Identifiers: *Aquatic systems, *Community analyses, *Diversity indices.

A detailed description and documentation are presented of a Fortran IV program called 'DIVERSITY'. Developing the program was an effort to solve the difficulties that are apparent when one attempts to evaluate community structures and relationships in an aquatic system and was brought about by the search for a broad-based set of indices and criteria to characterize the selected ecosystems being studied. The program is flexible and applied and has broad capabilities of performing certain functions useful in the summarization and simultaneous evaluation of sets of ecological data and for interpretation and evaluation of community structures. The program calculates diversity indices and tables of numbers and percentages for various arrangements of species into different groupings.
W74-11463

A CONTRIBUTION TO STATISTICAL DEPTH-DURATION-FREQUENCY ANALYSIS,
Cagliari Univ. (Italy). Inst. of Hydraulics.
For primary bibliographic entry see Field 2B.
W74-11469

FLOW SIMULATION SYSTEM,
Metropolitan Sanitary District of Greater Chicago, Ill., Industrial Waste Div.
For primary bibliographic entry see Field 2E.
W74-11477

HYDROMETRIC STATIONS IN ARID ZONES,
Ministry of Agriculture, Jerusalem (Israel). Hydrological Service.
For primary bibliographic entry see Field 7B.
W74-11496

THE MAGNITUDE OF ERRORS AT FLOW MEASUREMENT STATIONS,
Water Resources Board, Reading, (England).
For primary bibliographic entry see Field 7B.
W74-11504

THE EVALUATION OF DISCHARGE MEASUREMENTS IN STREAMS WITH CHANGING FLOW CONDITIONS,
Board for Water Resources Management, Luneburg (West Germany).
For primary bibliographic entry see Field 7B.
W74-11508

STREAM GAUGING WITH PORTABLE EQUIPMENT,
Research Council of Alberta, Edmonton.
For primary bibliographic entry see Field 7B.
W74-11516

PRECISION AND BIAS OF THE RESULTS OF DILUTION GAUGINGS,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 7B.
W74-11517

ACCURACY AND RATIONALIZATION OF RIVER DISCHARGE MEASUREMENTS,
Godudarstvennyi Gidrologicheskii Institut, Lengingrad (USSR).
For primary bibliographic entry see Field 7B.
W74-11527

MODERN POSITION FIXING METHODS,
Federal Board for Navigation, Coblenz (West Germany).
For primary bibliographic entry see Field 7B.
W74-11536

DIGITAL MEASUREMENTS OF RIVER BED PROFILES USING A GENERAL-PURPOSE DATA ACQUISITION SYSTEM,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 7B.
W74-11538

STATISTICAL PARAMETERS OF DISTRIBUTION OF GRANULATION INDICATING SUSPENDED SEDIMENT AND BED SEDIMENT,
Technische Universitaet, Dresden (East Germany). Dept. of Hydrology and Meteorology.
For primary bibliographic entry see Field 2J.
W74-11542

HYDRA II--AUTOMATIC DIGITAL TELEMETERING SYSTEM,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 7B.
W74-11555

WATER-QUALITY MONITORING AND DATA TRANSMISSION,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11556

A COMPUTER AUTOMATED SYSTEM FOR HYDROLOGIC DATA ACQUISITION AND ANALYSES,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 7B.
W74-11558

RECORDING AND TELETRANSMISSION OF MEASURED DATA IN HYDROLOGY AND RELEVANT WMO ACTIVITIES,
For primary bibliographic entry see Field 7B.
W74-11559

DEVELOPMENTS IN THE PROCESSING OF HYDROLOGICAL DATA IN AUSTRALIA,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Research.
M. J. Goodspeed, and J. A. Shaw.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 800-807, 1973. 11 ref.

Descriptors: *Data processing, *Hydrologic data, *Australia, *Digital computers, Current meters, Data collections, Data storage and retrieval, Stream gages, Flow measurement, Discharge measurement, Peak discharge, Information exchange, International hydrological decade.

In Australia, digital computers are used in processing hydrologic data. The use of chart conversion equipment for processing graphically recorded data is now almost standard and a start has been made in the use of recorders which employ computer-compatible media to record the data. Computers are used for rating current meters, calculating river discharges from current meter data, and computing daily and peak discharges, which are usually also stored on magnetic tape for subsequent analysis. In order to facilitate transfer of data between users with a wide range of computers and internal processing systems, standard interchange formats can handle virtually any data comments, and permit the tagging of data to indicate quality attributes. (See also W74-11493) (Knapp-USGS)
W74-11562

METHODS AND MEANS FOR PREPARING HYDROLOGICAL OBSERVATION RESULTS FOR PROCESSING ON COMPUTERS,
Scientific Research Inst. of Aeroclimatology, Moscow (USSR).
V. I. Grigoriev.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 808-813, 1973. 3 fig.

Descriptors: *Data processing, *Hydrologic data, *Digital computers, *Data storage and retrieval, Stream gages, Flow measurement, Discharge measurement, Information exchange, Water measurement, Water resources development, International hydrological decade.
Identifiers: USSR.

To solve water resources problems, the amount of hydrological information available must be increased, its quality and processing improved, and the transmission of data speeded up. Rapid and high-quality processing of hydrological information is possible only by means of modern computing facilities and, therefore, observational data must be programmed by means of punched cards, punched tapes or special forms for use by computers. Punched tape has advantages over other technical media, as well as being more convenient for storage and transmission. Data can be recorded onto punched tape from hydrological logbooks either by hand or automatically. By using punched tape it is possible to construct a flexible lay-out including all available data. This is very difficult to attain when using punched cards. However, neither punched cards nor punched tapes completely meet the necessary requirements for long-term storage of information. In this case microfilm is used for the creation of an easily available fund of hydrological data. (See also W74-11493) (Knapp-USGS)
W74-11563

ANALOGUE TO DIGITAL CONVERSION AND DATA ACQUISITION FROM CHARTS OF WATER LEVEL AND RAINFALL RECORDERS AND THEIR EVALUATION BY A COMPUTER,
Ruhrtalsperrenverein, Essen (West Germany).
K. Kleinenbroich.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 822-832, 1973. 4 fig, 1 tab.

Descriptors: *Data processing, *Hydrologic data, *Hydrograph analysis, *Digital computers, Data collections, Hybrid computers, Reservoir operation, Networks, International hydrological decade.
Identifiers: *Analog-digital converters, Germany.

By means of an on-line computer connected in the system, hydrographs can be converted into digital form, and the processor can evaluate them exactly, immediately, economically and with great efficiency. The co-ordinate reader can also be used as an off-line system and the computer is able to handle the perforated tapes of flow gages. Analog charts of any kind can be evaluated. The control of a large system of reservoirs in Germany, with fourteen storage basins for water supply of an industrial area is planned using an extended computer for optimization of surplus quantities. (See also W74-11493) (Knapp-USGS)
W74-11564

MANUAL AND AUTOMATIC EVALUATION OF HYDROMETRIC DATA IN ISRAEL,
Ministry of Agriculture, Jerusalem (Israel). Hydrological Service.
D. Kornitz, and N. I. Levy.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 833-856, 1973. 14 tab, 2 tab.

Descriptors: *Data processing, *Hydrologic data, *Hydrograph analysis, Automation, Data transmission, Data collections, Digital computers, Analog computers, Hybrid computers, Networks, International hydrological decade.
Identifiers: *Israel.

The conventional (manual) methods of computation of hydrological data, as applied in the Israeli Hydrological Service until recently and a newly developed system for automatic processing of hydrometric data are described. The automatic system is an integrated software-hardware graphic system based on an analytical approach. It is a real-time system consisting of a curve follower, processor, display unit, and a teletype for input-output. A plotter for graphic output is optional. This system enables direct processing of hydrological data in the office in a fraction of the time required by conventional means. (See also W74-11493) (Knapp-USGS)
W74-11565

EXPERIENCES WITH A FULLY AUTOMATIC CURVE SCANNER,
Bundesanstalt fuer Gewasserkunde, Coblenz (West Germany).
H. Schafer.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol II, p 857-864, 1973.

Descriptors: *Data processing, *Hydrologic data, *Hydrograph analysis, Analog computers, Digital computers, Hybrid computers, Automation, International hydrological decade.
Identifiers: Germany.

A fully automatic unit was designed for curve scanning and processing of hydrologic data. The unit is described and a report on two years of practical experience gained in its use in the evaluation of stage hydrographs is presented. A comparison with manual evaluation reveals the unit's pronounced superiority in performance and economy. Scanning and evaluation of cross-sections as a prerequisite for hydraulic calculations is also very efficient using the unit. (See also W74-11493) (Knapp-USGS)
W74-11566

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, FIFTH VOLUME,
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 6A.
W74-11574

A MULTISOURCE ATMOSPHERIC TRANSPORT MODEL FOR DEPOSITION OF TRACE CONTAMINANTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11651

FLOOD PLAIN INFORMATION, OHIO RIVER: OHIO COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-11677

UTILIZATION OF REMOTELY-SENSED DATA IN THE MANAGEMENT OF INLAND WETLANDS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11727

EXTRACTING LAND USE INFORMATION FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE DATA BY CONVENTIONAL INTERPRETATION METHODS,
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7B.
W74-11729

HYDROLOGIC DATA FOR LITTLE POND CREEK AND NORTH ELM CREEK, BRAZOS RIVER BASIN, TEXAS, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2E.
W74-11733

U.S. GEOLOGICAL SURVEY WATER QUALITY PROGRAM, INDIANA DISTRICT,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 5A.
W74-11734

HYDROLOGIC DATA FOR URBAN STUDIES IN THE FORT WORTH, TEXAS, METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2F.
W74-11737

DIGITAL MODEL OF THE OGALLALA AQUIFER OF THE NORTHERN PART OF THE NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2F.
W74-11741

FEASIBILITY OF DIGITAL WATER-QUALITY MODELING ILLUSTRATED BY APPLICATION AT BARSTOW, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W74-11750

SIDES: STORET INPUT DATA EDITING SYSTEM,
Environmental Protection Agency, Athens, Ga.
D. R. Barrow.
Available from NTIS, Springfield, Va 22161 as PB-227 052, Price $5.25 printed copy; $2.25 microfiche. Surveillance and Analysis Division (Region IV) Report, January 1973. 31 p, 1 fig.

Descriptors: *Computer programs, *Data storage and retrieval, *Data processing, *Water quality, Hydrologic data, Data collections.

The STORET Input Data Editing System (SIDES) is composed of five programs: PFSTO1, PFSTO2, PFSTO3, PFSTO4, and PFSTO5. SIDES was developed for application to field study data where several sets of data are collected at the same stations over a relatively short period of time. Specifically it was designed to improve data quality control and reduce turn around time between field study and report preparation. However it should find wide application to any system which handles repetitive sampling and analysis from a fixed station network. The system provides an easy-to-use card format for entering data into STORET particularly with respect to sample identification, a comprehensive pre-STORET editing system including immediate printouts to facilitate checking numerical data, and a simplified method for correcting data already entered into STORET. (Knapp-USGS)
W74-11759

SIMULATION OF MAJOR INORGANIC CHEMICAL CONCENTRATIONS AND LOADS IN STREAMFLOW,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-11764

SURFACE-WATER AVAILABILITY, TALLADEGA COUNTY, ALABAMA,
Geological Survey, University, Ala.
J. R. Harkins.
Alabama Geological Survey Map 112, 1972. 15 p, 5 fig, 2 map, 1 tab, 12 ref.

Descriptors: *Water resources, *Surface waters, *Maps, *Alabama, Low flow, Water yield, Streamflow, Hydrologic data, Data collections, Base flow.
Identifiers: *Talladega County(Ala).

The surface-water hydrology of Talladega County, Alabama, was analyzed and mapped to present the hydrologic information for quick visual appraisal. Average runoff, within the county, is about 0.9 mgd per square mile. Inflow into the county is about 7,600 mgd. The median annual 7-day low flow is well sustained by large quantities of spring flow. Streams in the county have a combined channel length of approximately 100 miles with 7-day low flow in excess of 2 mgd; 50 miles are in the 10 to 100 mgd range and 13 miles are in the 100 to 1,000 mgd range. The Coosa River, which is the western border of the county, has a 7-day low flow in excess of 1,000 mgd and storage of 622,400 acre-feet. The chemical quality of the water is good for most uses. (Knapp-USGS)
W74-11767

A TECHNIQUE FOR INTERPRETATION OF MULTISPECTRAL REMOTE SENSOR DATA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
A. N. Williamson.
Available from NTIS, Springfield, Va. 22161 as N73-31312 Price $3.00 printed copy; $2.25 microfiche. September 1973. 15 p.

Descriptors: *Remote sensing, *Satellites(Artificial), *Chesapeake Bay, *Water quality, *Data processing, Turbidity, Path of pollutants, Solar radiation, Data collections, Computer programs.
Identifiers: *ERTS.

ERTS-1 satellite data can be used to detect alterations to the absorption and scattering properties caused by movement of suspended particles and solutes in the Chesapeake Bay and to delineate flow patterns, flushing action of the estuary, and sediment and pollutant dispersion. Techniques have been developed that permit automatic interpretation of data from any multispectral remote sensor with computer systems which have limited memory capacity and computing speed. The multispectral remote sensor is considered a reflectance spectrophotometer. The data which define the spectral reflectance characteristics of a scene are scanned pixel-by-pixel. Each pixel whose spectral reflectance matches a reference spectrum is identified, and the results are shown in a map that identifies the locations where spectrum matches were detected and spectrum that was matched. (Knapp-USGS)
W74-11773

SPLASH (SPECIAL PROGRAM TO LIST AMPLITUDES OF SURGES FROM HURRICANES): 1. LANDFALL STORMS,
National Weather Service, Silver Spring, Md.
For primary bibliographic entry see Field 2E.
W74-11776

GREAT LAKES ICE COVER, WINTER 1970-71,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
For primary bibliographic entry see Field 2C.
W74-11777

ENCROACHING SALT WATER IN NORTHEAST PALM BEACH COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
H. G. Rodis.
Florida Bureau of Geology Map Series No 59, 1973. 1 sheet, 6 fig, 4 photo.

Descriptors: *Saline water intrusion, *Aquifers, *Surface waters, *Florida, Withdrawal, Drainage systems, Canals, Saline water-freshwater interfaces, Surface-groundwater relationships.
Identifiers: *Palm Beach County(FL), *Loxahatchee River(FL).

Seawater is encroaching inland in northeast Palm Beach County and adjacent parts of Martin County. It threatens the freshwater resources of growing coastal communities and a river. In the early 1900's, man began to drain the Everglades to make additional land available for farms and homes and began to connect lakes and streams to the sea. The flow of freshwater to the estuary and into the shallow aquifer gradually diminished, thereby changing the balance between the freshwater and saltwater environments and causing saltwater to move inland. Today, saltwater tides reach the upper Loxahatchee River (northeast fork), destroying freshwater flora and fauna. Saltwater, no longer held back by highwater levels, is encroaching into the shallow aquifer. Parts of the salt front near heavily pumped municipal and irrigation wells have advanced inland about 1/2 mile. The upper reach of the Loxahatchee River is one of the last remaining natural rivers in south Florida. The river requires a sustained flow of freshwater to nourish plant and animal communities and to prevent saltwater from moving farther upstream. Except for occasional floods, the flow of freshwater has diminished at an accelerated rate, as rainfall runs off quickly through an expanding system of drainage canals. During the 1970-71 drought, the flow of the river was about 200 gpm. A sustained flow many times greater than this is necessary to maintain the freshwater environment of the river, even in part. Potential freshwater resources are available from the shallow aquifer in areas west of the present well fields. Treated sewage and storm runoff could be used to irrigate golf courses or to maintain a head of freshwater at the fresh, salt water interface. Much of the remaining freshwater environment of the Loxahatchee River can be maintained by a sufficient flow of freshwater. This could be provided by diverting enough freshwater from inland canals and water-storage areas to the river to retard the advance of saltwater. Preventing upstream movement of saltwater tides by constructing a salinity barrier, dam, or lock downstream also would aid in maintaining the freshwater environment. (Knapp-USGS)
W74-11779

THE ILLINOIS URBAN DRAINAGE AREA SIMULATOR, ILLUDAS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5B.
W74-11889

THE NORTH ATLANTIC OCEAN AS A SOURCE OF ATMOSPHERIC N2O,
Max-Planck-Institut fuer Chemie, Mainz (West Germany).
For primary bibliographic entry see Field 2K.
W74-11900

HYDROGEOLOGICAL MAPS OF KOREA, 2. UPPER JINWI RIVER BASIN, (IN KOREAN),
Korea Geological and Mineral Inst., Seoul.
J. U. Lim, and J. W. Kim.
Geological Survey of Korea, Seoul, 1972. 39 p, 17 fig, 8 tab.

Descriptors: *Hydrogeology, *Water resources, *Hydrologic data, *Maps, *Aquifer characteristics, Aquifers, Areal hydrogeology, Groundwater basins, Hydrology, Hydrologic aspects, Surveys, *Water wells, Aquifer testing, Hardness(Water), Alkalinity, Chemical properties, Water quality, Water properties, Topography.
Identifiers: *Korea(Upper Jinwi River Basin).

Two hydrogeological maps describe the groundwater resources of the upper part of the Jinwi River basin, an area of 357 square km, in the middle part of the Korean peninsula. Delineated are the alluvial sand and gravel aquifers, data on the hydrologic properties and chemical quality of groundwater. Locations of wells, test holes, and other data collection points are identified by a coordinate system shown on a well-numbering diagram. Pump test data are tabulated for 183 wells. Eighteen chemical constituents of the water are tabulated for 61 wells. An English explanatory text is included. (Humphreys-ISWS)
W74-11908

FLOOD-PLAIN AREAS OF THE LOWER MINNESOTA RIVER.
Geological Survey, Saint Paul, Minn.
Water-Resources Investigations 15-74 (open-file map index report), 1973. 12 plates.

Descriptors: *Floods, *Minnesota, *Flood plains, Flood plain zoning, Flood protection, Stage-discharge relations, Flood profiles, Backwater, Flood data.
Identifiers: *Minnesota River.

The flood-plain of the lower Minnesota River was studied from the mouth to Carver Rapids, 36 miles upstream. In this reach, there are flood-plain lands subject to recurrent flooding within the unincorporated areas of Scott and Carver Counties and 11 municipalities. The primary purpose of this study is to provide the information needed for adoption and administration of local flood-plain regulations. The hydrologic data contained can be used to evaluate the extent, depth, and frequency of flooding that will affect economic development of flood-plain areas in the lower Minnesota River valley. Designated floodways are shown for the entire study area. The effect of planned encroachment, by development to the limits of these floodways, is evaluated and incorporated into flood protection elevation profiles. Flooding in the study area results not only from flows originating within the Minnesota River basin, but also from flows originating in the Mississippi River upstream from the mouth of the Minnesota River. (Knapp-USGS)
W74-11969

DOCUMENTATION FOR SNSIM1/2, A COMPUTER PROGRAM FOR THE STEADY-STATE WATER QUALITY SIMULATION OF A STREAM NETWORK,
Environmental Protection Agency, New York. Data Systems Branch.
For primary bibliographic entry see Field 5B.
W74-11978

SELECTED HYDROLOGIC DATA IN THE UPPER COLORADO RIVER BASIN,
Geological Survey, Washington, D.C.
D. Price, and K. M. Waddell.
Hydrologic Investigations Atlas HA-477, 1973. 2 sheets, 3 tab, 4 graphs, 9 maps, 57 ref.

Descriptors: *Water resources, *Colorado River, *Arizona, *Colorado, *New Mexico, *Utah, *Wyoming, Colorado River Basin, Groundwater, Hydrogeology, Aquifers, Water quality.

The groundwater resources of the upper Colorado River basin are described in a 2-sheet hydrological atlas. The maps in this atlas are highly generalized, and are intended to provide only a general understanding of the geology, groundwater conditions, and chemical quality of water in the basin as a whole. Rocks ranging in age from Precambrian to Holocene are exposed in the Upper Colorado River basin. The rocks have been grouped into five basic geohydrologic units on the basis of age and general lithologic characters. Alluvium in geohydrologic unit 1 and volcanic rocks in geohydrologic unit 2 contain aquifers that have the highest hydraulic conductivities. Yields to individual wells and springs generally are small in most parts of the basin. Properly located and constructed wells in the thicker (100 ft or more) alluvial deposits yield 500 to more than 1,000 gpm, and some of the most productive wells in the entire basin tap both alluvium and volcanic rocks in the upper Fremont River valley, where several wells yield more than 1,000 gpm. Only about 5 percent of the maximum estimated volume of groundwater stored in the basin is in unconsolidated deposits that have high hydraulic conductivities. About 85 percent of the maximum estimated volume of stored water occurs in the rocks of geohydrologic units 3, 4, and 5, which generally yield the water slowly; and much of that water is moderately to highly mineralized. Hydrographs of wells indicate that there have been no significant depletions of storage in the basin owing to groundwater development. (Knapp-USGS)
W74-11979

AVAILABILITY OF DATA ON SURFACE-WATER QUANTITY AND QUALITY FOR THE SAN FRANCISCO BAY REGION, CALIFORNIA, WITH A SUMMARY OF BENEFICIAL USES AND IMPLICATIONS FOR LAND USE,
Geological Survey, Menlo Park, Calif.
J. Goss.
Interpretive Report 5 (Map MF-526), 1974. 1 fig, 1 map, 4 tab, 15 ref.

Descriptors: *Surface waters, *Data collections, *Basic data collections, *California, *Land use, Planning, Water quality, Water utilization, *Pollutant identification.
Identifiers: *San Francisco Bay(CA).

Surface-water resources in the San Francisco Bay region are discussed and sources of data are shown on a map. Water-quality criteria and important pollutants are discussed in relation to the water quality recommended for intended beneficial uses. Water-quality objectives recommended by the California Water Quality Control Board for streams, other water bodies, and drainage basins are reviewed. Examples of the kinds of problems that require decisions by planners and government officials are given. (Knapp-USGS)
W74-11980

COON RAPIDS POOL HYDROGRAPHIC STUDY,
Geological Survey, Saint Paul, Minn.
For primary bibliographic entry see Field 2E.
W74-11981

GEOLOGY AND GROUNDWATER FOR LAND-USE PLANNING IN THE EAGLE RIVER-CHUGIAK AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 4B.
W74-11982

WATER RESOURCES OF THE LARAMIE, SHIRLEY, HANNA BASINS AND ADJACENT AREAS, SOUTHEASTERN WYOMING,
Geological Survey, Washington, D.C.
M. E. Lowry, S. J. Rucker, IV, and K. L. Wahl.
Hydrologic Investigations Atlas HA-471, 1973. 4 sheets, 14 fig, 5 tab, 10 maps, 36 ref.

Descriptors: *Water resources, *Data collections, *Wyoming, *Hydrologic data, Water yield, Groundwater, Surface waters, Duration curves, Surface-groundwater relationships, Groundwater basins, Water quality.
Identifiers: Laramie Basin(WY).

The availability and quality of groundwater and flow characteristics and quality of water in the major streams were studied in the Laramie Basin, the Shirley Basin, and the Hanna Basin, all in southeastern Wyoming. Tremendous quantities of water are present in rocks underlying the area. Considering only the sandstone, which may average more than 10 percent porosity, there would be in excess of 64 acre-feet of water stored in a sandstone 1 foot thick and 1 mile square. Groundwater suitable in quantity and quality for stock use is generally available at depths of 500 feet or less. Most wells for which data are available are used for stock or domestic supplies. Flow-duration curves show the distribution of daily discharges for the period for which the curve is compiled. There is, in most places, a free exchange of water between streams and flood-plain deposits to the extent that any significant change in the quantity in one will be reflected in the other. No areas were identified during this study where perennial streams lose water to bedrock formations. The most prevalent condition is typified by that in the Laramie Basin. There, the areal relations of water in bedrock to water in the Little Laramie and Laramie Rivers indicate that bedrock underlying the flood plain of these rivers is not sufficiently permeable to measurably affect the flow of the Laramie River by either increasing or decreasing discharge. (Knapp-USGS)
W74-11983

SUSPENDED-SEDIMENT LOAD OF TEXAS STREAMS, COMPILATION REPORT OCTOBER 1965-SEPTEMBER 1971,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 2J.
W74-11991

GROUNDWATER RESOURCES OF BRAZOS AND BURLESON COUNTIES, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 4B.
W74-11994

HYDROLOGIC DATA FOR COW BAYOU BRAZOS RIVER BASIN TEXAS, 1972,
Geological Survey, Austin, Tex.
J. K. VanZandt.
Open-file report, May 1974. 72 p, 3 fig, 3 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Texas, Rainfall-runoff relationships, Storm runoff, Flood control, Dams, Reservoirs, *Data collections, Basic data collections.
Identifiers: Cow Bayou(TX).

Rainfall, runoff, and storage data collected during the 1972 water year for the 85.0-square-mile area above the stream-gaging station Cow Bayou at Mooreville, Texas are reported. The location of floodwater-retarding structures and hydrologic in-

struments in the area are shown. There are 26 floodwater-retarding structures in the watershed upstream from the stream-gaging station at Mooreville. The weighted-mean rainfall over the study area during the 1972 water year was 29.45 inches, or 90 percent of the 14-year (1959-72) average of 32.65 inches. Yearly mean discharge at the stream-gaging station was 20.1 CFS, compared with the 14-year average of 35.2 CFS. Annual runoff at the stream-gaging station was 14,600 acre-feet. (Knapp-USGS)
W74-11999

8. ENGINEERING WORKS

8A. Structures

VISCOUS DRAG REDUCTION IN DEVELOPING PIPE FLOW,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 8B.
W74-11755

SPILLWAY CREST DESIGN,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-11757

SPILLWAY FOR LOCK AND DAM 26, MISSISSIPPI RIVER, MISSOURI AND ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-11990

8B. Hydraulics

HYDRAULICS OF MAIN CHANNEL-FLOODPLAIN FLOWS,
Oklahoma State Univ., Stillwater. School of Agricultural Engineering.
C. E. Rice.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 263; $3.25 in paper copy, $2.25 in microfiche. Oklahoma Water Resources Research Institute, Stillwater, Completion Report, (1974). 31 p, 9 fig, 6 tab, 2 ref. OWRTA-030-OKLA(1). 14-31-0001-4036.

Descriptors: *Channels, *Flood plains, *Uniform flow, Flood waves, *Unsteady flow, Slopes, Hydraulics, *Open channel flow.
Identifiers: *Combined channels, Manning coefficient.

A tilting frame with a main channel-floodplain combined channel 44-feet long was used to run steady and unsteady flow tests with three surface roughnesses at five different slopes. The major objective was to evaluate, from physical experiments, the effect of floodplain flow on the flow in the main channel. Also, methods of computing uniform flow discharges in a combined channel and flow wave movement through a combined channel reach were studied. The floodplain appeared to have a significant retarding effect on the main channel flow and the combined channel Manning Coefficient increases as the floodplain width increased relative to the main channel width. The hydraulic radius as ordinarily computed in a regular channel resulted in erroneous discharge values for a combined channel in the depth range immediately above bank-full stage of the main channel. None of the methods commonly to compute uniform flow discharge in a combined channel gave good results over the complete range of flow depths for the main channel-floodplain combination. Except at very shallow floodplain depths, there was no difference in water surface elevation between the main channel and floodplain sections during the passage of a flood wave through the channel reach. The forward and backward characteristic equations of the unsteady flow equations, solved using an explicit finite difference representation and centered difference scheme, did an adequate job of routing the flood waves through the combined channel into the main channel and floodplain sections and assuming a horizontal transverse water surface for the channel.
W74-11462

WAVE TRANSMISSION THROUGH POROUS STRUCTURES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
O. S. Madsen.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 100, No WW3, Proceedings Paper 10714, p 169-188, August 1974. 2 fig, 1 tab, 10 ref, 3 append.

Descriptors: *Breakwaters, *Porous media, *Ocean waves, *Coastal structures, Hydraulic structures, Sea wall, Shore protection, Engineering structure, Hydraulic conductivity, Waves(Water), Wave action, Unsteady flow, Hydraulic properties, Energy dissipation, Transmissivity, Currents(Water).
Identifiers: *Wave propagation, *Wave interference, Reflective coefficients.

Assuming long, normally incident waves on a homogeneous porous structure of rectangular cross section, a simple explicit solution for the transmission and reflection coefficients were obtained from a linearized theory. The relationship between the nonlinear flow resistance in the porous medium and its equivalent linear form was obtained in explicit form. Empirical relationships for the nonlinear flow resistance are reviewed and shown to lead to acceptable estimates of the hydraulic properties of a porous medium. Using the empirical relationships for the hydraulic properties of a porous material in conjunction with the explicit simple solution for the reflection and transmission coefficients leads to results comparable to the results of other more time-consuming procedures. (Humphreys-ISWS)
W74-11474

NONLINEAR WAVE FORCES ON HALF-CYLINDER AND HEMISPHERE,
Chicago Bridge and Iron Co., Plainfield, Ill. Marine Research and Development.
S. K. Chakrabarti, and R. A. Naftzger.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 100, No WW3, Proceedings Paper 10710, p 189-204, August 1974. 9 fig, 3 tab, 15 ref, 3 append.

Descriptors: *Ocean waves, *Wave action, *Waves(Water), *Flow around objects, Deep water, Potential flow, Harbors, Structures, Storage tanks, Oil, Hydraulics.
Identifiers: *Nonlinear wave forces, *Offshore structures, Submerged structures.

Explicit expressions are derived for the pressures and forces on a deeply submerged, bottom seated halfcylinder and hemisphere due to Stokes' nonlinear gravity waves up to fifth order. The reflection of the waves due to the presence of the object is included in the analysis. The flow is taken to be irrotational, and the effect of the free surface on the reflected wave components is neglected, assuming deep submergence of the object. For both shapes, the theoretical forces are compared with the analytical and experimental force data published for small amplitude, first-order waves. (Humphreys-ISWS)
W74-11475

CIRCULAR JUMPS,
Sargent and Lundy, Chicago, Ill.
S. C. Mehrotra.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY8, Proceedings Paper 10758, p 1133-1140, August 1974. 5 fig, 5 ref, 2 append. NSF Grant GA-31247.

Descriptors: *Hydraulic jump, *Weirs, *Control, *Specific head, Momentum equation, Hydraulics, Critical flow, Transition flow, Flow control.
Identifiers: *Circular hydraulic jump, Radial flow.

Circular jumps of radial flows on a horizontal circular disk mounted with a peripheral weir were studied theoretically for their location and strength on an inviscid and hydrostatic basis. Unlike their two-dimensional counterpart, stationary circular jumps form for a range of weir heights for prescribed upstream conditions, and their location and strength can be found for any weir height within this range on an inviscid basis. The significance of a circular jump lies in its eminent amenability to treatment on a relatively simple basis. (Humphreys-ISWS)
W74-11476

QUADRATIC LOSS AND SCATTERING OF LONG WAVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
C. C. Mei, P. L-F. Liu, and A. T. Ippen.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 100, No WW3, Proceedings Paper 10754, p 217-239, August 1974. 3 fig, 2 tab, 15 ref, 3 append. NSF Grant GK-4243.

Descriptors: *Waves(Water), *Coastal engineering, *Breakwaters, Wave action, Energy loss, Wavelengths, Shallow water, Harbors, Currents(Water), Flow separation, Mathematical studies, Analytical techniques.
Identifiers: *Harmonic analysis, Quadratic forms, Long waves, Constrictions.

A wave train past sharp convex corners or narrow passages may suffer energy loss due to flow separation. Representing the energy loss by a surface drop proportional to the square of the local velocity, the effects incurred on the wave train are studied theoretically for one-dimensional transmission problems. When the constriction is asymmetrical, an induced current is found along with the radiation of higher harmonics. (Humphreys-ISWS)
W74-11478

METHOD OF ADDITIONAL SEEPAGE RESISTANCES--THEORY AND APPLICATION,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W74-11479

CHANNEL FRICTION AND SLOPE EFFECTS ON HARBOR RESONANCE,
State Univ. of New York, Buffalo. Dept. of Engineering Science.
R. P. Shaw, and C-K. Lai.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 100, No WW3, Proceedings Paper 10706, p 205-215, August 1974. 10 fig, 9 ref, 3 append.

Descriptors: *Coastal engineering, *Harbors, *Inlets(Waterways), Ocean waves, Ocean currents, Surface waters, Currents(Water), Wavelength, Vibration, Channel flow, Channels, Friction, Slopes, Velocity, Hydraulics.
Identifiers: Harbor resonance, Ocean engineering.

An approximate matching technique uses separate solutions in a semi-infinite ocean bounded by a

straight coastline, a harbor basin, and a narrow straight entrance channel which connects them. Wave height and velocity are matched at the interfaces. Such an approach allows different solutions to be used in any of the three regions, when the physical description of that region is modified, without changing the solutions used in the remaining regions. The entrance channel is first considered to possess a wall/bottom friction although the remaining regions are kept frictionless. Results indicate that the channel effect, which leads to increasing resonance amplification with increasing channel length analogous to the well-known harbor paradox, is counteracted by the increase in frictional effects for a longer channel. The second problem considered modified the entrance channel to have a linear slope from a constant depth ocean to a harbor basin at some other constant depth. (Humphreys-ISWS)
W74-11480

PROBLEMS IN THE DESIGN OF MEASURING STRUCTURES,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 7B.
W74-11507

CHEMICAL METHOD OF WATER FLOW MEASUREMENT IN OPEN CHANNELS,
State Inst. for Hydrology and Meteorology, Warsaw (Poland).
For primary bibliographic entry see Field 7B.
W74-11515

ADVERSE-BOTTOM-SLOPE WEIR AND ORIFICE,
Egyptian Desert Inst., Cairo.
For primary bibliographic entry see Field 7B.
W74-11518

FREE SURFACE SUBCRITICAL FLOW MEASUREMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 7B.
W74-11520

FLOW OVER SIDE-WEIRS,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
K. Subramanya, and S. C. Awasthy.
In: Symposium on Hydrometry, September 1970, Koblenz, West Germany: International Association of Hydrological Sciences Publication No 99, Vol I, p 328-335, 1973. 4 fig, 1 tab, 5 ref.

Descriptors: *Weirs, *Stage-discharge relations, *Discharge coefficient, Flow measurement, Discharge measurement, Hydraulic models, International hydrological decade.
Identifiers: Side-weirs.

Flow over sharp-edged side-weirs in rectangular channels was analyzed. The parameters affecting the coefficient of discharge were identified and an expression was derived analytically for the variation of the discharge coefficient of a side-weir of zero height with the Froude number of upstream main channel flow. The experimental data show a very good agreement with this expression. The discharge coefficient of side-weirs of finite height was also studied experimentally and is essentially the same for the corresponding side-weir of zero height. (See also W74-11493) (Knapp-USGS)
W74-11521

GAUGING STATIONS ON SEDIMENT-LOADED MOUNTAIN RIVERS,
Swiss Federal Water Resources Bureau, Bern.
For primary bibliographic entry see Field 7B.
W74-11522

THE AIR-BUBBLE METHOD OF FLOW MEASUREMENT AND ITS APPLICATION,
National Water Authority, Budapest (Hungary).
For primary bibliographic entry see Field 7B.
W74-11525

LE (LEADING EDGE) FLOWMETER--A UNIQUE DEVICE FOR OPEN CHANNEL DISCHARGE MEASUREMENT,
For primary bibliographic entry see Field 7B.
W74-11533

THE INTENSE EVALUATION OF DISCHARGE MEASUREMENTS BY THE EQUATIONS OF THE UNIVERSAL VELOCITY DISTRIBUTION LAW,
Bayerischer Gewaesserkundedienst Staatlich Byaerische, Munich (West Germany).
For primary bibliographic entry see Field 2E.
W74-11567

HYPOLIMNETIC FLOW REGIMES IN LAKES AND IMPOUNDMENTS,
Pennsylvania Univ., Philadelphia. Dept. of Civil and Urban Engineering.
J. E. Edinger, N. Yanagida, and I. M. Cohen.
Copy available from GPO Sup Doc as EP1.23:660/2-74-053, $2.10; microfiche from NTIS as PB-235 391, $2.25. Environmental Protection Agency Technology Series, Report EPA-660/2-74-053, June 1974. 177 p, 27 fig, 18 tab, 18 ref, 3 append. EPA Project 16080 FVK, Grant No R-800943.

Descriptors: *Stratified flow, *Flow profiles, *Interfaces, *Research facilities, Continuity equation, Density currents, Fluid friction, Free surfaces, Hydraulics, Impounded waters, Momentum equation, Nonuniform flow, Saline water - fresh water interfaces, Steady flow, Thermal stratification.
Identifiers: *Hypolimnetic flow regimes, *Experimental open-channel flume, *Interfacial profile equations.

The 'hypolimnetic flow' is a two-layered flow with the upper layer stagnant. This report presents the possibility of different flow regimes for the hypolimnetic flow which may be determined from the parameters of slope of channel bottom, flow depth, flowrate, density difference of water in the two layers, and channel roughness. The analysis is limited to the steady-state case of the hypolimnetic flow and the 'upper layer analysis' in which the lower layer is stagnant. Interfacial profile equations which predict possible existence of ten different flow regimes for the hypolimnetic flow and two regimes for the upper layer analysis were obtained from the equations of continuity and momentum for two-layered flow. Experimental apparatus, consisting of a large scale open-channel tilting flume and water supply and control systems capable of circulating water of two different temperatures was designed and constructed. The experiment employed observations of a dyed flow layer and measurements of vertical temperature distributions in the flume. It was found that eight different flow regimes could be generated in the flume for the hypolimnetic flow on the positive and horizontal slopes. (EPA)
W74-11578

LEAST COST DESIGN OF BRANCHED PIPE NETWORK SYSTEM,
Weston (Roy F) Inc., West Chester, Pa.
A. K. Deb.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 100, No EE4, Proceedings paper No. 10711, p 821-835, August 1974. 4 fig, 4 tab, 8 ref.

Descriptors: *Water distribution(Applied), *Networks, *Design, Costs, *Pipe flow, *Environmental engineering, Hydraulics, Economics, Optimization, Hazen-Williams equation, Head loss, Size, Variability, Mathematical models, Systems analysis.
Identifiers: *Cost minimization, Branched pipe networks.

A new method is presented for the direct least cost solution of pipe sizes of a branched pipe network of known geometry consisting of pumping station and network of pipes for known water consumptions incorporating various cost functions. The method gives optimum distribution of total head loss among the various branches and pipes of the system, and the Hazen-Williams equation is used in obtaining least cost pipe sizes for an assumed total head loss in the system. The effects of the variation of total head loss on the total cost of the pipe network are studied. This method is simple and can be used efficiently for least cost design of branched water main systems only, with the aid of a desk calculator. A systematic procedure of calculation is described and illustrated using two sample problems. (Bell-Cornell)
W74-11647

ESTIMATING FLOOD DISCHARGES IN NEVADA USING CHANNEL-GEOMETRY MEASUREMENTS,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 4A.
W74-11742

SURFACE JET STREAM EXCESS TEMPERATURE ANALYSIS,
Geological Survey, Bay Saint Louis, Miss.
For primary bibliographic entry see Field 5B.
W74-11748

VISCOUS DRAG REDUCTION IN DEVELOPING PIPE FLOW,
Colorado State Univ., Fort Collins. Engineering Research Center.
J. P. Tullis, and K. L. V. Ramu.
Available from NTIS, Springfield, Va 22161, as AD-771 456, Price $3.50 printed copy; $2.25 microfiche. Hydro Machinery Laboratory Report No 34, November 1973. 54 p, 41 fig, 8 tab, 40 ref. Navy Contract N00014-67-A-0299-0021.

Descriptors: *Flow friction, *Drag, *Turbulent flow, *Polymers, Hydraulics, Fluid mechanics, Flow resistance, Viscosity.
Identifiers: *Drag reduction.

Turbulent flow in the entrance region of a rough pipe was studied for pure water flow and with polymer injection into a boundary layer. A mathematical model was developed for predicting boundary layer thickness, core velocity, and pressure coefficient in the inlet region. Drag reductions above 90% were observed in the inlet region. In the fully developed region the maximum drag reduction measured was 80% at 25 ppm. At the highest concentration used (74 ppm) the drag reduction was only 74%. Drag reduction in the inlet region appeared to be independent of injection concentration. Velocity profiles generally followed the Meyer model in the fully developed region but significantly deviated from it in the entry region. The velocity profile, diffusion and drag reduction were strongly dependent on the Reynolds number. (Knapp-USGS)
W74-11755

SPILLWAY CREST DESIGN,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
T. E. Murphy.
Available from NTIS, Springfield, Va 22161 as AD-774 802, Price $3.00 printed copy; $2.25 microfiche. Miscellaneous Paper H-73-5, December 1973. 9 p, 3 plate, 1 tab, 3 ref.

Descriptors: *Spillway crests, *Design, *Hydraulic design, *Design flow, Spillways, Dams, Hydraulics.
Identifiers: *Spillway design.

A method is given for design of the weir crest for any depth of approach or inclination of the upstream face of the spillway. The curvature of the crest is most critical immediately upstream from the crest line, in the vicinity of the crest line, and for a vertical distance of no more than one design head downstream from the crest line. There should not be a discontinuity at the intersection of the spillway crest and the upstream face of the dam. With flow at the design head, the downstream profile should result in zero pressure on the spillway crest for a vertical distance of about one design head downstream from the crest line. Tests are proposed in order to provide specific design data. (Knapp-USGS)
W74-11757

EMBANKMENT DEFORMATIONS DUE TO WATER LOADS,
Sydney Univ. (Australia). School of Civil Engineering.
J. R. Booker, and H. G. Poulos.
Available from NTIS, Springfield, Va. 22161 as PB-228 454 Price $5.00 printed copy; $2.25 microfiche. Research Report No R-224, September 1973, 38 p, 24 fig, 10 ref.

Descriptors: *Dams, *Deformation, *Loads(Forces), Load distribution, Earth pressure, Soil pressure, Pressure, Weight, Earth dams, Soil mechanics, Engineering structures, Hydraulic structures.

The stresses and deformations within an embankment due to water loading acting on the upstream face were calculated and a parametric study was made of the variables affecting the deformations. A basic series of solutions was obtained for a homogeneous embankment and the effects of water level, embankment slope, and Poisson's ratio were investigated. Deformations increase as embankment slope or Poisson's ratio increase, and very large increases in deformations occur as the water level approaches the top of the embankment. Some evidence of this phenomenon was found in cast records relating to earth dams. (Knapp-USGS)
W74-11771

DRAG REDUCTION BY POLYMER ADDITION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
M. T. Landahl.
Available from NTIS, Springfield, Va. 22161 as AD-763 824 Price $3.00 printed copy; $2.25 microfiche. Interim Scientific Report AFOSR-TR-73-1200, for Air Force Office of Scientific Research, 1972. 59 p, 18 fig, 92 ref. AF Contract F44620-71-C-0007.

Descriptors: *Reviews, *Polymers, *Drag, Turbulent flow, Hydraulics, Hydrodynamics, Flow resistance, Flow friction, Fluid friction, Turbulence.
Identifiers: *Drag reduction.

Changes in turbulence structure brought about by addition of polymers to water are reviewed, and an effort is made to explain these in the light of recent advances in the study of shear flow turbulence in ordinary fluids. A simplified theoretical model of shear flow wall turbulence is presented, with the aid of which an exploratory study of the influence of some non-Newtonian fluid properties is carried out. With extremely high-molecular-weight polymers only a few parts per million of weight of solvent is sufficient in some cases to lead to drag reductions of 50% or more. Generally, the emphasis in this review is on the more recent contributions, particularly those having a bearing on turbulence structure, but some of the older material of interest for giving the background is also included. (Knapp-USGS)
W74-11780

RADIATION AND SCATTERING OF WATER WAVES BY RIGID BODIES: PART 2. VERTICAL CYLINDERS OF CIRCULAR CROSS-SECTION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
J. L. Black, M. C. G. Bray, and C. C. Mei.
Available from NTIS, Springfield, Va. 22161 as AD-771 626 Price $3.75 printed copy; $2.25 microfiche. Water Resources and Hydrodynamics Laboratory Contract Report, 1971. 32 p, 12 fig. ONR Contract N00014-67-A-264-0036 NFS Grant-GK4243.

Descriptors: *Refraction(Water waves), *Piles(Foundations), Equations, Waves(Water), Hydraulics, Coastal engineering, Coastal structures.
Identifiers: *Diffraction(Water waves).

The diffraction of water waves by a vertical pile extending over the full depth is essentially the same as the two-dimensional diffraction of sound waves by a cylinder, and the theory for some simple shapes can be regarded as known. A vertical cylinder extending over part of the water depth is considerably more difficult. Upon comparison with the exact solution for the limit case of a full cylinder, numerical difference appears to exist over ranges of practical interest. The case of a totally submerged circular resting on the sea bottom is also of engineering (storage tanks) as well as oceanographic (submarine islands) significance. Calculations for both cases were made by incorporating the Rayleigh-Ritz procedure to insure a desired accuracy in far field quantities, and by using Haskind's theorem for wave forces. (Knapp-USGS)
W74-11787

STUDIES ON RUNOFF CHARACTERISTICS IN CHANNEL NETWORK SYSTEMS IN LOW LAND,
For primary bibliographic entry see Field 2A.
W74-11865

FREE SURFACE SLOPES AT CONTROLS IN CHANNEL FLOW,
New South Wales Univ., Manly Vale (Australia).
D. L. Wilkinson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY8, Proceedings Paper 10753, p 1107-1117, August 1974. 7 fig, 2 ref, 2 append.

Descriptors: *Flow control, *Channels, *Open channel flow, *Weirs, Control, Hydraulics, Discharge(Water), Continuous flow, Steady flow, Critical flow, Transition flow, Cross-sections, Flow profiles, Overflow, *Slopes.

The slope of a free water surface in steady open channel flow is indeterminate at a control section. The surface slope is finite and, subject to certain approximations, determinate. Expressions were derived for the surface slopes of critical flows over a smooth weir and through a smooth contraction. Experiments confirmed the validity of these expressions up to surface slopes of arc tan 0.3 for weirs and arc tan 0.8 for contractions. It was shown that the same expressions could have been obtained using the one-dimensional energy equation, even though the assumption of hydrostatic pressure is not valid. The expression derived for the water surface slope yielded a well-conditioned equation for numerical calculation of water surface profiles through a control. Using surface slope at a control section as a rating parameter is a possibility. (Humphreys-ISWS)
W74-11888

SURFACE-WAVE TRANSPORT IN NONUNIFORM CANALS,
Hawaii Univ., Honolulu. Inst. of Geophysics.
R. W. Preisendorfer.
Available from NTIS, Springfield, Va. 22161 as COM-73-10404, Price $3.00 printed copy; $2.25 microfiche. Report HIG-72-18 (NOAA-JTRE-80), July 1972. 372 p, 17 ref. NSF Grant AG-253.

Descriptors: *Waves(Water), *Unsteady flow, *Open channel flow, *Numerical analysis, Nonuniform flow, Computer programs, Mathematical models, Tides, Bores, Canals, Regime, Water conveyance.
Identifiers: Linear canal theory.

The boundary value problems of water wave propagation in classic linear canal theory are completely reformulated in terms of the transport concepts of reflection and transmission of nonuniform canal segments and abrupt junctions. This results in a relatively efficient numerical approach to the problem of predicting water wave elevations in nonuniform canals subsequent to invasion by external waves at the ends of the canal. The treatment rests on two key ideas. The first idea is to conceptually split the surface-wave elevation into two counter-flowing waves in such a way as to be valid even in the nonuniform portions of canals; these wave components are governed by a pair of coupled first order linear ordinary differential (the two-flow) equations equivalent to the original classic second order canal equation. The second idea is to decompose a canal into simple modules whose reflectance and transmittance properties are determined numerically or analytically from the two-flow equations. These module properties are recombined according to algebraic rules developed in the transport approach to canal water waves, thereby permitting a wide variety of canal configurations constructible from a small set of modules. The two-flow theory complements the classic theory in supplying relatively simple formulas that characterize the boundary value problems directly in terms of canal geometry. (Knapp-USGS)
W74-11968

INVESTIGATION OF DIFFUSION IN OPEN-CHANNEL FLOWS,
Geological Survey, Bay Saint Louis, Miss.
For primary bibliographic entry see Field 2E.
W74-11972

SPILLWAY FOR LOCK AND DAM 26, MISSISSIPPI RIVER, MISSOURI AND ILLINOIS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
N. R. Oswalt, and G. A. Pickering.
Available from NTIS, Springfield, Va 22161 as AD-768 780, Price $3.50 printed copy; $2.25 microfiche. Technical Report H-73-15, October 1973. 62 p, 12 fig, 25 plate, 1 ref.

Descriptors: *Spillways, *Gates, *Mississippi River, Hydraulics, Hydraulic models, Bank protection, Locks, *Missouri, *Illinois.

Tests were conducted on two models of the Lock and Dam 26 spillway on the Mississippi River in Missouri and Illinois to determine discharge characteristics of the spillway, stilling basin performance, riprap requirements downstream from the structure, and gate vibration tendencies. The stilling basin as originally designed resulted in unsatisfactory performance with only one gate open full. Several modifications to the basin were tested in an effort to effect better energy dissipation and spread flow downstream during single-gate operations. A stilling basin that resulted in satisfactory flow conditions was developed. Riprap will be needed for a distance of 1200 ft downstream from the basin. No vibrations will occur in the gates with the range of flow conditions expected for the project. Gate openings and tailwater elevations required to pass ice and debris were also determined. (Knapp-USGS)

W74-11990

8C. Hydraulic Machinery

CALIBRATION OF CURRENT METERS IN A SUBMERGED JET,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-11503

LOW ENERGY MECHANICAL METHODS OF RESERVOIR DESTRATIFICATION,
Oklahoma State Univ., Stillwater. School of Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W74-11572

DEVELOPMENT PROGRAM AND TEST INSTRUMENTATION FOR VTE/MSF MODULE PLANT, FOUNTAIN VALLEY, CALIFORNIA.
Envirogenics Co., El Monte, Calif.
For primary bibliographic entry see Field 3A.
W74-11635

CONCEPTUAL DESIGN AND COST ESTIMATE 2.5 MGD DIRECT CONTACT CONDENSATION MULTISTAGE FLASH DESALINATION PLANT,
Fluor Corp. Ltd., Los Angeles, Calif.
For primary bibliographic entry see Field 3A.
W74-11637

PRELIMINARY EVALUATION OF FLUIDIC TECHNIQUES FOR FLOW MODULATION IN THE MULTI-STAGE FLASH DISTILLATION PROCESS,
Bowles Fluidics Corp., Silver Spring, Md.
For primary bibliographic entry see Field 3A.
W74-11827

VTE EVAPORATORS FOR GEOTHERMAL BRINES,
Badger (W.L.) Associates, Inc., Ann Arbor, Mich.
For primary bibliographic entry see Field 3A.
W74-11829

200 MGD DESALTING PLANT CONCEPTUAL STUDY, ADVANCED THIN FILM DISTILLATION PROCESS AND TEST MODULE DESIGN.
Aqua-Chem, Inc., Waukeska, Wis.
For primary bibliographic entry see Field 3A.
W74-11830

MSF DISTILLATION PLANT (MODULE), VERTICAL TUBE EVAPORATION (VTEX), SEMI-ANNUAL REPORT, JUNE 1, 1970, THROUGH DECEMBER 31, 1970,
Catalytic, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 3A.
W74-11831

MANAGEMENT, OPERATION AND MAINTENANCE OF BRACKISH WATER TEST FACILITY, ROSWELL, NEW MEXICO, JULY 1970 - APRIL 1972,
Burns and Roe Construction Corp., Paramus, N.J.
For primary bibliographic entry see Field 3A.
W74-11832

JET AERATOR HAS HIGH OXYGENATION CAPACITY.
For primary bibliographic entry see Field 5D.
W74-11858

8D. Soil Mechanics

EMBANKMENT DEFORMATIONS DUE TO WATER LOADS,
Sydney Univ. (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-11771

SEEPAGE IN MISSISSIPPI RIVER BANKS: REPORT 1, ANALYSIS OF TRANSIENT SEEPAGE USING A VISCOUS-FLOW MODEL AND THE FINITE DIFFERENCE AND FINITE ELEMENT METHODS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
For primary bibliographic entry see Field 4A.
W74-11989

8E. Rock Mechanics and Geology

GEOLOGIC IMPLICATIONS,
Iowa State Univ., Ames. Dept. of Earth Science.
For primary bibliographic entry see Field 6B.
W74-11580

HIGH-PRESSURE MECHANICAL PROPERTIES OF KAYENTA SANDSTONE,
California Univ., Livermore. Lawrence Livermore Lab.
A. G. Duba, A. E. Abey, B. P. Bonner, H. C. Heard, and R. N. Schock.
Available from National Information Service, Springfield, Va., 22161 as UCRL-51526, $4.00 paper copy, $2.25 in microfiche. Report No UCRL-51526, February 1974. 25 p, 11 fig, 3 tab, 25 ref.

Descriptors: *Stress analysis, *Sandstones, Physical properties, *Strain measurements, *Rock mechanics, Conductivity, Ultrasonics, Nuclear explosions, Testing, Underground, Subsurface investigations, Porosity, Model studies, Shear.
Identifiers: *Kayenta sandstone, *Pressure-volume relationship(Sandstone), Stress-strain measurements.

The mechanical response of materials to the large stress pulses typical of high-energy and nuclear explosives is a matter of importance for site hardening, as well as stemming and containment, in the underground testing program of the Defense Nuclear Agency (DNA). To improve computer modeling techniques and to study the response of a porous sandstone, the Mixed Company event, a well-instrumented experiment using high-energy explosives, was performed at a site in Mesa County, Colorado. Pressure-volume, uniaxial strain loading, uniaxial stress loading to failure, and ultrasonic velocity determinations have been performed on samples of Kayenta sandstone from the site of the Mixed Company event. The experimental procedure and test results are given. (Houser-ORNL)
W74-11662

COST AND FEASIBILITY OF STIMULATING TIGHT GAS RESERVOIRS WITH CHEMICAL EXPLOSIVES,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 8H.
W74-11663

DEEP SELF-BURIAL OF RADIOACTIVE WASTES BY ROCK-MELTING CAPSULES,
New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
For primary bibliographic entry see Field 5E.
W74-11664

PERCUSSIVE WATER JETS FOR RAPID EXCAVATION--FINAL REPORT,
Scientific Associates, Inc., Santa Monica, Calif.
For primary bibliographic entry see Field 8H.
W74-11997

8G. Materials

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-15.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 488/AS, $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-959, June 1972, 41 p. OSW-AEC Agreement 14-01-0001-2535, Work Order No 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 75 publications relating to the corrosion and performance of materials of construction used in saline water conversion processes. The publications abstracted include research and development reports issued by the Office of Saline Water, as well as articles appearing in the open literature. The major portion of the report is a reproduction of a computer printout of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 18 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are included. The keywords, used to identify the contents of a publication, have been selected from a thesaurus of approximately 839 words developed by the Center. (OSW)
W74-11809

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-14.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 487/AS, $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-958, March 1972. 38 p. OSW-AEC Agreement 14-01-0001-2535, Work Order No 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 75 publications relating to the corrosion and performance of materials of construction used in saline water conversion processes. The publications abstracted include research and development reports issued by the Office of Saline Water, as well as articles appearing in the open literature. The major portion of the report is a reproduction of a computer printout of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 16 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are included. The keywords, used to identify the contents of a publication, have been selected from a thesaurus of approximately 839 words developed by the Center. (OSW)
W74-11810

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-13.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 486/AS; $3.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-957, December 1971. 34 p. OSW-AEC Agreement 14-01-0001-2535, Work Order No. 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 60 publications relating to the corrosion and performance of materials of construction used in saline water conversion processes. The publications abstracted include research and development reports issued by the Office of Saline Water, as well as articles appearing in the open literature. The major portion of the report is a reproduction of a computer printout of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 16 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are included. The keywords, used to identify the contents of a publication, have been selected from a thesaurus of approximately 825 words developed by the Center. (OSW)
W74-11811

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-12.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 485/AS; $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-956, September 1971. 50 p. OSW -AEC Agreement 14-01-0001-2535, Work order No. 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 75 publications relating to the corrosion and performance of materials of construction used in saline water conversion processes. The publications abstracted include research and development reports issued by the Office of Saline Water, as well as articles appearing in the open literature. The major portion of the report is a reproduction of a computer printout of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 18 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are included. The keywords, used to identify the contents of a publication, have been selected from a thesaurus of approximately 800 words developed by the Center. (OSW)
W74-11812

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-11.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 484/AS; $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-955, June 1971. 46 p. OSW-AEC Agreement 14-01-0001-2535, Work Order No 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 75 publications relating to the corrosion and performance of materials of construction used in saline water conversion processes. The publications abstracted include research and development reports issued by the Office of Saline Water, as well as articles appearing in the open literature. The major portion of the report is a reproduction of a computer printout of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 21 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are included. The keywords, used to identify the contents of a publication, have been selected from a thesaurus of approximately 800 words developed by the Center. (OSW)
W74-11813

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-10.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 483/AS; $3.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-954, March 1971. 36 p. OSW-AEC Agreement 14-01-0001-2535, Work Order No 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 50 publications relating to the corrosion and performance of materials of construction used in saline water conversion processes. The publications abstracted include research and development reports issued by the Office of Saline Water, as well as articles appearing in the open literature. The major portion of the report is a reproduction of a computer printout of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 17 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are included. The keywords, used to identify the contents of a publication, have been selected from a thesaurus of approximately 775 words developed by the Center. (OSW)
W74-11814

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-9.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 482/AS; $3.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-953, December 1970. 39 p. OSW-AEC Agreement 14-01-0001-2535, Work Order No 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 60 publications relating to the corrosion and performance of materials of construction used in saline water conversion processes. The publications abstracted include research and development reports issued by the Office of Saline Water, as well as articles appearing in the open literature. The major portion of the report is a reproduction of a computer printout of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 14 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are included. The keywords, used to identify the contents of a publication, have been selected from a thesaurus of approximately 750 words developed by the Center. (OSW)
W74-11815

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-8.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 481/AS; $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-952, September 1970. 44 p. OSW-AEC Agreement 14-01-0001-2535, Work Order No 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 50 reports which have been issued by the Office of Saline Water relating to the corrosion and performance of materials of construction used in saline water conversion processes. The major portion of the report is a reproduction of a computer printout of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 17 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are included. The keywords used to identify the contents of the report have been selected from a thesaurus developed by OSW-MIC. (OSW)
W74-11816

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-7.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 480/AS; $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-951, June 1970. 47 p. OSW-AEC Agreement 14-01-0001-2535, Work Order No 12.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 55 reports, most of which have been issued by the Office of Saline Water, relating to the corrosion and performance of materials of construction used in saline water conversion processes. The body of the report is a copy of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 17 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are given. The keywords, used to identify the content of the reports, have been selected from a thesaurus developed by OSW-MIC. (OSW)
W74-11817

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-6.
Oak Ridge National Lab., Tenn.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 479/AS; $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-950, March 1970. 44 p. OSW-AEC Agreement 14-01-0001-534, Work Order No 22.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 50 reports, most of which have been issued by the Office of Saline Water, relating to the corrosion and performance of materials of construction used in saline water conversion processes. The body of the report is a copy of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 18 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are given. The keywords, used to identify the content of the reports, have been selected from a thesaurus developed by OSW-MIC. (OSW)
W74-11818

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-5.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 478/AS; $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-949, December 1969. 48 p. OSW-AEC Agreement 14-01-0001-534, Work Order No 22.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 50 reports, most of which have been issued by the Office of Saline Water, relating to the corrosion and performance of materials of construction used in saline water conversion processes. The body of the report is a copy of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 19 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are given. The keywords, used to identify the content of the reports, have been selected from a thesaurus developed by OSW-MIC. (OSW)
W74-11819

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-4.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 477/AS; $3.75 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-948, September 1969. 44 p. OSW-AEC Agreement 14-01-0001-534, Work Order No 22.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 50 reports, most of which have been issued by the Office of Saline Water, relating to the corrosion and performance of materials of construction used in saline water conversion processes. The body of the report is a copy of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 20 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are given. The keywords, used to identify the content of the reports, have been selected from a thesaurus developed by OSW-MIC. (OSW)
W74-11820

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-3.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 476/AS; $3.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-947, June 1969. 37 p. OSW-AEC Agreement 14-01-0001-534, Work Order No 22.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials.

Abstracts are given for 50 reports, most of which have been issued by the Office of Saline Water, relating to the corrosion and performance of materials of construction used in saline water conversion processes. The body of the report is a copy of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) located at the Oak Ridge National Laboratory. The abstracts contained in this report are grouped in 16 categories and are repeated if they fall into more than one category. An author index and a keyword index to the reports referenced are given. The keywords, used to identify the content of the reports, have been selected from a thesaurus developed by OSW-MIC. (OSW)
W74-11821

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-2.
Oak Ridge National Lab., Tenn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 475/AS; $3.25 in paper copy, $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-946, March 1968. 36 p. OSW-AEC Agreement 14-01-0001-534, Work Order No 22.

Descriptors: *Bibliographies, *Corrosion, Corrosion control, *Desalination, Performance, *Materials, *Concrete additives.
Identifiers: *Concrete-polymer materials.

Abstracts are given for 45 reports issued by the Office of Saline Water relating to the corrosion and performance of materials of construction used in saline water conversion processes. The body of the report is a copy of information stored in a computerized storage and retrieval system for the Materials Information Center of the Office of Saline Water (OSW-MIC) at the Oak Ridge National Laboratory. The abstracts contained in the report are grouped in 20 categories and repeated on occassion if they fall into more than one category. The publication also contains a summary of a recently issued report on concrete-polymer materials. An author index and a keyword index to the reports referenced are given. The keywords, used to identify the contents of the reports, have been selected from a thesaurus developed by OSW-MIC. (OSW)
W74-11822

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-1.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 3A.
W74-11823

FINAL REPORT STUDY OF THE APPLICATION OF ALUMINUM AS A PRINCIPAL MATERIAL OF CONSTRUCTION IN A 50 MGD MULTISTAGE FLASH DISTILLATION SYSTEM.
Foster Wheeler Corp., Livingston, N.J.
For primary bibliographic entry see Field 3A.
W74-11824

8H. Rapid Excavation

HIGH-PRESSURE MECHANICAL PROPERTIES OF KAYENTA SANDSTONE,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 8E.
W74-11662

COST AND FEASIBILITY OF STIMULATING TIGHT GAS RESERVOIRS WITH CHEMICAL EXPLOSIVES,
California Univ., Livermore. Lawrence Livermore Lab.
G. H. Higgins, T. R. Butkovich, and D. Montan.
Available from National Technical Information Service, Springfield, Va., 22161 as Report No UCRL-51512; $4.00 paper copy, $2.25 in microfiche. Report No UCRL-51512, January 16, 1973. 15 p, 6 fig, 2 tab, 10 ref.

Descriptors: *Secondary recovery(Oil), *Natural gas, *Nuclear explosions, *Explosions, *Chemical potential, Comparative benefits, Comparative costs, Hydraulic engineering, Geology, Rock mechanics, Economics, Onsite tests.
Identifiers: *Hydraulic fracturing, Project Rulison, Plowshare.

Long, continuous, cylindrical charges of high explosives are considered as alternatives to nuclear explosives or massive hydraulic fracturing for the stimulation of gas production in tight gas formations. The calculational method was that used previously for nuclear stimulation; it was verified by comparison of the calculated and observed gas production from Rulison. The calculations indicate that charges of high explosives 24 inches in diameter and 2000 feet in length (the height assumed for the gas-bearing sands) detonated in four wells per section would be comparable in cost and effectiveness to estimates for one well stimulated by three 100-kiloton nuclear explosions. Stimulation by high explosives would require special development of the explosives (probably with ammonium nitrate as the base) to be suitably sensitive, temperature-resistant, and compatible with the gas-reservoir rocks; the required work appears to be straightforward, however. Comparative field testing is required to determine the optimum method (chemical or nuclear explosives or hydraulic fracturing) for a given region and to confirm that gas can be produced profitably for between $0.25 and $0.80 per Mcf. (Houser-ORNL)
W74-11663

REPORTS AVAILABLE IN PLOWSHARE OPEN FILE.
Nevada Operations Office (AEC), Las Vegas.
For primary bibliographic entry see Field 5B.
W74-11671

DIRECTED EXPLOSIONS--EXPERIENCE AT MEDEO,
A. N. Romashov.
Available from NTIS, Springfield, Va 22161 as AD-771 657, Price $3.25 printed copy; $2.25 microfiche. Air Force Foreign Technology Division Wright-Patterson AFB, Ohio, Machine Translation Report FTD-MT-24-326-74, November 1973. 22 p, 4 fig. (Translated from Priruda, No 3, p 61-67, 1968).

Descriptors: *Dams, *Earth dams, *Explosions, Craters, Excavation, Explosives, Construction, Dam construction.
Identifiers: *Medeo(USSR).

A dam was constructed by use of explosives at Medeo on the Malaya Almatinka River, USSR. It has a height of approximately 100 m. The explosion was required not only for destruction and breaking up of the edges of the gorge, but also for transferring the crushed rock into the body of the dam from distances as far as 300 m. The weight of a single charge in a separate chamber exceeded 3600 tons, and the total weight of all the charges was close to 10,000 tons. (Knapp-USGS)
W74-11768

PERCUSSIVE WATER JETS FOR RAPID EXCAVATION--FINAL REPORT,
Scientific Associates, Inc., Santa Monica, Calif.
E. B. Nebeker, and S. E. Rodriguez.
Available from NTIS, Springfield, Va 22161 as AD-772 931, Price $3.75 printed copy, $2.25 microfiche. Contract Report for Army Mobility Equipment Research and Development Center, December 1973. 54 p, 13 fig, 41 ref. Army Contract No DAAK02-73-C-0163.

Descriptors: *Jets, *Excavation, *Rock mechanics, *Tunneling, Hydraulics, Unsteady flow.
Identifiers: Rapid excavation.

Percussive water jets were tested for their utility for rock excavation. A percussive jet applies force to the rock as a series of high-frequency impacts, rather than steadily. Percussive impact has various favorable features for rock excavation: increased impact area per unit water volume, repetitive initial-impact waterhammer pressure and high lateral outflow velocity, cyclical stress unloading, and short-duration stressing. Percussive jets can be produced by modulating the jet discharge. Modulated free stream bunching was observed by stroboscopic light; oscilloscope traces of percussive impact were obtained by means of a piezoelectric force gage with high-frequency response. Rock impact test were performed using a 0.06-inch diameter nozzle and 8300 psi discharge pressure on massive specimens of granite, limestone, and sandstone. The experimental percussive jets, modulated at frequencies of 5000 and 2000 cycles/sec, and conventional unmodulated jets were discharged at the rocks under the same conditions in order to compare their effects. In granite, the percussive jets produced substantial fracture cavities whereas the unmodulated jets could at most produce slight roughening of the surface. In limestone, the percussive jets were four or five times as efficient as the unmodulated jets, and in sandstone about twice as efficient. (Knapp-USGS)
W74-11997

8I. Fisheries Engineering

THE LENGTH OF RESIDENCE OF JUVENILE FALL CHINOOK SALMON IN SIXES RIVER, OREGON,
Oregon Fish Commission, Port Orford. Div. of Management and Research.
P. E. Reimers.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10202, $3.00 in paper copy; $2.25 in microfiche. Research Reports of the Fish Commission of Oregon, Vol 4, No 2, June 1973. 43 p, 29 fig, 8 tab, 43 ref.

Descriptors: *Chinook salmon, *Oregon, *Aquatic habitats, *Life cycles, Estuaries, Rivers, Streams, Fish reproduction, Fisheries, Fry, Growth rates, Growth stages, Life history studies, Migration.
Identifiers: *Sixes River(OR).

The life history of juvenile fall chinook salmon was studied in Sixes River, a small coastal river of Oregon, by documenting the length of residence of the juveniles throughout the river, exploring several factors influencing their length of residence, and assessing the relative importance of freshwater and estuarine rearing areas for producing returning spawners. Spawning occurred mostly in the tributary streams, primarily in Dry Creek. Most fish spawned from November to January. Fry emerged from the gravel from March to May. Newly emerged fry moved downstream from the spawning areas in large numbers at night. This movement apparently resulted from emergence at night and lack of visual orientation of the fry during the darkness. Downstream movement was reduced during increased light levels. Many juveniles remained in freshwater until early summer. Most then entered the estuary, possible because of high temperature in the main river. A small number of fish continued to reside in the cool spawning tributaries. The population level in the estuary peaked at about 145,000 fish during July and August and then declined to a low level in autumn. The rate of growth of the juveniles was reduced for 3 months during the period of high population abundance. After the population declined in late summer, growth of juveniles again improved. Following the autumn freshets, most fall chinook salmon entered the ocean. A few fish from the tributary populations remained in freshwater through the winter and migrated to the ocean as yearlings the following spring. The type-3 fish, those remaining in freshwater until early summer and then remaining for a period of improved growth in the estuary, represented about 90% of the returning spawners. Based on the return of these type-3 fish, freshwater and estuarine rearing were concluded to be about equally important to fall chinook salmon in Sixes River. (Knapp-USGS)
W74-11788

PAUNCH MANURE AS A FEED SUPPLEMENT IN CHANNEL CATFISH FARMING,
Oklahoma Cooperative Fishery Unit, Stillwater.
For primary bibliographic entry see Field 5C.
W74-11796

CARP CULTURE IN SINGAPORE: A CASE STUDY,
Singapore Univ.
T. L. Wah.
J Trop Geogr. 35: p 67-74, 1972. Illus.
Identifiers: *Carp cultures, Mangrove, *Singapore, Swamp.

The freshwater fishers of Singapore at present provide an insignificant proportion of the local production of fresh fish: only 852 tons (4.7%) out of a total of 18,026 tons in 1970. There is little likelihood of an areal expansion of freshwater fisheries on the island because of the shortage of land and the need to put the land, wherever possible, to more productive and more profitable uses than fish culture. However, there are still some areas of swampland in the less accessible and therefore less valuable parts of Singapore which could conceivably be cleared for freshwater fish ponds. A farm is described which is a particularly good example of how mangrove swamps have been converted to profitable use as fish ponds. There could be more commercial carp farms run along the same lines.--Copyright 1973, Biological Abstracts, Inc.
W74-11945

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

A SELECTED ANNOTATED BIBLIOGRAPHY ON THE ANALYSIS OF WATER RESOURCE SYSTEMS, FIFTH VOLUME,
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 6A.
W74-11574

SELECTED IRRIGATION RETURN FLOW QUALITY ABSTRACTS 1972-1973, THIRD ANNUAL ISSUE.
Dept. of Agricultural Engineering. EPA, Office of Research and Development Colorado State Univ., Fort Collins, Colo.
For primary bibliographic entry see Field 5G.
W74-11576

A SURVEY OF PAPERS ON ECOSYSTEMS ANALYSIS FROM 1947-1971 IN THE JOURNAL 'ECOLOGY',
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-11668

ENVIRONMENTAL RESEARCH PUBLICATIONS, JANUARY 1971-JULY 1973.
National Environmental Research Center, Cincinnati, Ohio. Technical Information Office.
For primary bibliographic entry see Field 5G.
W74-11746

POLLUTED GROUNDWATER: A REVIEW OF THE SIGNIFICANT LITERATURE,
General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
For primary bibliographic entry see Field 5B.
W74-11800

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-15.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11809

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-14.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11810

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-13.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11811

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-12.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11812

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-11.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11813

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-10.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11814

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-9.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11815

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-8.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11816

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-7.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11817

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-6.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11818

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-5.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11819

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-4.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11820

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-3.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11821

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-2.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 8G.
W74-11822

INDEXED BIBLIOGRAPHY ON CORROSION AND PERFORMANCE OF MATERIALS IN SALINE WATER CONVERSION PROCESSES-1.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 3A.
W74-11823

SOIL SYSTEMS FOR MUNICIPAL EFFLUENTS - A WORKSHOP AND SELECTED REFERENCES,
East Central State Coll., Ada, Okla. School of Environmental Science.
For primary bibliographic entry see Field 5D.
W74-11924

ENERGY--A SPECIAL BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D.C.
Available from NTIS, Springfield, Va. 22161 as NASA SP-7042, Price $6.00 printed copy; $2.25 microfiche. Special Report 7042, April 1974. 524 p.

Descriptors: *Bibliographies, *Energy, *Abstracts, Energy conversion, Nuclear energy, Solar radiation, Thermal power, Geothermal studies.

This literature survey of special energy and energy related documents lists 1708 reports, articles, and other documents introduced into the NASA scientific and technical information system between January 1, 1968, and December 31, 1973. Citations from International Aerospace Abstracts (IAA) and Scientific and Technical Aerospace Reports (STAR) are grouped according to the following subject categories: energy systems; solar energy; primary energy sources; secondary energy sources; energy conversion; energy transport, transmission, and distribution; and energy storage. Included are subject, personal author, corporate source, contract, report, and accession indexes. (Knapp-USGS)
W74-11966

ENERGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D.C.
Available from NTIS, Springfield, Va. 22161 as NASA SP-7043(01), Price $4.00 printed copy; $2.25 microfiche. Special Publication 7043(01), May 1974. 68 p.

Descriptors: *Bibliographies, *Energy, *Abstracts, Energy conversion, Nuclear energy, Solar radiation, Thermal power, Geothermal studies.

This is the first issue of a new quarterly publication, Energy: A Continuing Bibliography with Indexes (NASA SP-7043). It lists 232 reports, journal articles, and other documents originally announced between January 1, 1974 and March 31, 1974 in Scientific and Technical Aerospace Reports (STAR) or in International Aerospace Abstracts (IAA). The coverage includes regional, national and international energy systems; research and development on fuels and other sources of energy; energy conversion, transport, transmission, distribution and storage, with special emphasis on use of hydrogen and of solar energy. Also included are methods of locating or using new energy resources. Of special interest is energy for heating, lighting, for powering aircraft, surface vehicles, or other machinery. Five indexes-subject, personal author, corporate source, contract number, and report number are included. The indexes are of the cumulating type throughout the year, with the fourth quarterly publication containing abstracts for the fourth quarter and index references for the four quarterly publications. (Knapp-USGS)
W74-11967

A BIBLIOGRAPHY ON OCEAN WASTE DISPOSAL.
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 05E.
W74-11985

10C. Secondary Publication And Distribution

OREGON'S ESTUARIES: DESCRIPTION AND INFORMATION SOURCES FOR OREGON'S ESTUARIES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 02L.
W74-11575

LAND APPLICATION OF SEWAGE EFFLUENTS AND SLUDGES: SELECTED ABSTRACTS,
Robert S. Kerr Environmental Research Laboratory, Ada, Okla.
For primary bibliographic entry see Field 05D.
W74-11577

NSF-RANN TRACE CONTAMINANTS DIRECTORY, 1973,
Oak Ridge National Lab., Tenn. Toxic Materials Information Center.
For primary bibliographic entry see Field 05A.
W74-11961

10D. Specialized Information Center Services

SIDES: STORET INPUT DATA EDITING SYSTEM,
Environmental Protection Agency, Athens, Ga.
For primary bibliographic entry see Field 07C.
W74-11759

10F. Preparation Of Reviews

PLANNING AND ANALYSIS OF METROPOLITAN WATER RESOURCE SYSTEMS,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 06A.
W74-11451

SEWAGE ELECTROLYSIS,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-11871

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- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 23
DECEMBER 1, 1974

W74-12001 -- W74-12750

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 7, NUMBER 23
DECEMBER 1, 1974

W74-12001 -- W74-12750

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

RESEARCH IN THE COASTAL AND OCEANIC ENVIRONMENT,
Delaware Univ., Newark. Coll. of Marine Sciences.
W. S. Gaither, and V. Klemas.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-772 104. Technical Report No 25, November 1973. 36 p, 7 fig, 2 ref. N00014-69-A0407.

Descriptors: *Coasts, *Oceans, *Environment, *Remote sensing, Waves(Water), Soil properties, Turbidity, Geology, Currents(Water), Sediment transport, Mathematical models, Shores, Computer programs, Forecasting, Physical properties, Hydrography, Delaware, Meteorological data, Estuaries, North Carolina, Georgia, Florida, Tidal marshes, Methane.
Identifiers: *Seacoasts, Delaware Bay(Delaware), Coastal zone.

Research emphasizing coastal geologic processes, wave and sediment analysis, and remote sensing investigations is summarized. A process-response model based on Krumbein's concept was conceived and formulated for beach processes. A conceptual classification of sandy coastal plain shorelines was completed. Mechanics of sediment motion and transport in the wave field were systematically analyzed, and the results applied to the random wave field. Probabilistic and statistical concepts and methods are being developed for practical and reliable predictions of primary physical, meteorological and geological parameters. A thermodynamic model of sea state has been developed on the analogy drawn between the problem of black body radiation in thermal physics and the problem of spectral distribution of wave energy in air-sea interactions. Optical Fourier techniques were employed to determine changing directional spectrum of waves. Fronts, a major hydrographic feature in Delaware Bay and other estuaries, have been investigated. An inexpensive, rapid approach for continuously monitoring optical water properties along a coastal transect has been developed. Marsh gas of southeastern tidal mangrove marshes, Spartina, freshwater acidic and sawgrass swamps was compared to that from inland marshes separated from tidal action and indicated a Eh relationship. (Jones-Wisconsin)
W74-12554

1B. Aqueous Solutions and Suspensions

RESEARCH IN THE COASTAL AND OCEANIC ENVIRONMENT,
Delaware Univ., Newark. Coll. of Marine Sciences.
For primary bibliographic entry see Field 1A.
W74-12554

2. WATER CYCLE

2A. General

HYDROLOGIC CONSEQUENCES OF USING GROUNDWATER TO MAINTAIN LAKE LEVELS AFFECTED BY WATER WELLS NEAR TAMPA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4B.
W74-12013

SELECTED BIBLIOGRAPHY ON WATER BALANCE OF MONSOON ASIA (III),
Meteorological Research Inst., Tokyo (Japan).
For primary bibliographic entry see Field 2B.
W74-12019

DEVELOPMENT OF A UNIFIED TRANSPORT MODEL FOR TOXIC MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12022

INTERNATIONAL WORKSHOP ON THE HYDROLOGICAL EFFECTS OF URBANIZATION, WARSAW, 1973.
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 4C.
W74-12052

A FEASIBILITY STUDY OF USING REMOTELY SENSED DATA FOR WATER RESOURCE MODELS,
Colorado State Univ., Fort Collins.
J. F. Ruff.
Available from NTIS, Springfield, Va 22161 as N73-23479, Price $3.75 printed copy; $2.25 microfiche. National Aeronautics and Space Administration Contractor Report CR-129001, February 1973. 29 p, 15 fig, 2 tab, 4 ref. NAS 8-28590.

Descriptors: *Remote sensing, *Water resources, *Colorado, Water temperature, Snow surveys, Water yield, Sedimentation, Erosion, Clouds, Scour.
Identifiers: *Wolf Creek watershed(Colo).

Remotely sensed data were collected in the Wolf Creek watershed in southwestern Colorado over a 1-year period. Cloud top temperatures were measured using a radiometer. Thermal imagery of the Wolf Creek Pass area was obtained during one predawn flight. Remote sensing studies of water resource problems were also conducted. Remote sensing techniques assist in the solution of water resource problems. Photogrammetric determination of snow depths is feasible. Changes in turbidity or suspended material concentration can be observed. Surface turbulence can be related to bed scour. Thermal effluents into rivers can be monitored. (Knapp-USGS)
W74-12072

WATERSHED MODELLING USING A SQUARE GRID TECHNIQUE,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
N. Kouwen.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 418-434, 1973. 3 fig, 7 ref.

Descriptors: *Mathematical models, *Rainfall-runoff relationships, *Storm runoff, *Runoff forecasting, *Canada, Infiltration, Water storage, Discharge(Water), Finite element analysis.

A typical Southern Ontario watershed was simulated using storage discharge relationships for 1 km x 1 km square elements. With the model, hydrographs may be based on forecast weather, especially with regard to the prediction of flood peaks based on presumed weather conditions. Precipitation data measured by radar may be used in calculating storm runoff during a storm to aid in the operation of dams. Runoff passes through successive square elements to lower elevations. The elements are ordered with respect to their elevation and calculation proceeds in a downstream sequence. For each element there exists: a channel capacity-drainage area function; a surface storage-channel inflow function; a surface storage-infiltration function; a subsurface storage-channel inflow function; and a channel storage-channel discharge function. (See also W74-12087) (Knapp-USGS)
W74-12105

SEQUENTIAL GENERATION OF STREAMFLOW,
Indian Inst. of Tech., New Delhi. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-12281

TWO-DISTRIBUTION METHOD FOR MODELING AND SEQUENTIAL GENERATION OF MONTHLY STREAMFLOWS,
Illinois State Water Survey, Urbana. Hydrology Section.
For primary bibliographic entry see Field 2E.
W74-12283

BASSETT CREEK WATERSHED MODEL,
Barr Engineering Co., Minneapolis, Minn.
L. J. Kremer.
Water Resources Bulletin, American Water Resources Association, Vol 10, No 4, p 789-793, August 1974. 3 fig, 5 ref.

Descriptors: *Minnesota, *Watersheds(Basins), *Model studies, *Urban hydrology, Hydrograph analysis, Synthesis, Surface waters, Floods, Flood control, Hydrology, Runoff, Surface runoff, Storm runoff, Urbanization.
Identifiers: Minneapolis(Minn), *Bassett Creek Watershed(Minn).

A synthetic hydrograph method was utilized in the development of a watershed model for a small urbanizing watershed. The model was applied to the watershed and the largest flood of record was accurately reproduced. Because the model would be utilized for design of flood control plans with complete urbanization, the method was also applied to an urbanized watershed and reproduced a measured event with good results. The method does not require extensive hydrologic data for its implementation, can be applied to watersheds in various stages of urbanization, and permits consideration of natural or potential floodwater storage. (Dawes-ISWS)
W74-12285

THE APPLICATION OF RIDGE REGRESSION ANALYSIS TO A HYDROLOGIC TARGET-CONTROL MODEL,
Wyoming Univ., Laramie. Dept. of Statistics and Atmospheric Resources.
For primary bibliographic entry see Field 2E.
W74-12286

WATERPROOFING SURFACE-ZONE SOIL AGGREGATES FOR WATER CONSERVATION,
Hebrew Univ., Rehovot (Israel). Faculty of Agriculture.
For primary bibliographic entry see Field 2G.
W74-12289

PROCEDURES FOR FILLING GAPS IN HYDROLOGIC EVENT SERIES,
Pennsylvania State Univ., Harrisburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-12291

ECOSYSTEM MODELING OF A FORESTED RIVER BASIN,
Washington Univ., Seattle. Coll. of Forest Resources.
J. A. Ryan, I. G. Morison, and J. S. Bethel.

Water Resources Bulletin, American Water Resources Association, Vol 10, No 4, p 703-709, August 1974. 11 ref.

Descriptors: *Ecosystems, *River basins, *Forest watersheds, *Runoff, Model studies, Forest management, *Washington, Land use, Environmental effects, Precipitation, Evapotranspiration, Sediment load, Simulation analysis.
Identifiers: Physical parameters, *Deterministic models, *Snohomish River Basin(Wash), Stream temperature, Multiple player management game, Cascade Mountains(Wash), Resource management, Detention storage.

The forest ecosystem of the Snohomish River Basin in the Cascade Mountains of western Washington was modeled to develop an effective decision tool for evaluating environmental impacts resulting from land and forest management practices. A computer simulation model dealt with physical subsystems including product conversion, forest production, recreation supply, wildlife and fisheries, and the interaction of these processes with the water and atmosphere. This model was interfaced with a multiple player management game which enabled land managers, manufacturers, and regulators to make decisions and respond to environmental effects. Responses of the hydrologic system to management decisions were simulated by the water subsystem model. The model emphasized non-point as well as point source impacts. Since the significance of impacts varies with land use and goals of the game players, the model had flexible resolution and was able to predict conditions for both large and small scale. The water subsystem model responded to management decisions by game players for 40 acre cells within the Basin. The model determined which streams were affected, defined the contributing watershed, and extracted model parameters and information from a data bank. Using these parameters and precipitation inputs, mean flow on monthly and annual bases was calculated for the impacted subwatersheds and the 21 major watersheds of the Basin. Water quality responses calculated were suspended sediment concentration and stream temperature increase due to exposure. (Adams-ISWS)
W74-12294

DECISION ANALYSIS OF A GAMMA HYDROLOGIC VARIATE,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
For primary bibliographic entry see Field 2B.
W74-12301

THE KERNEL FUNCTION OF LINEAR NONSTATIONARY SURFACE RUNOFF SYSTEMS,
Technion - Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-12302

ACCURACY OF PRECIPITATION MEASUREMENTS FOR HYDROLOGIC MODELING,
Silver Spring, Md. National Weather Service, Hydrologic Research and Development Lab.
For primary bibliographic entry see Field 2B.
W74-12304

THE DESIGN OF RAINFALL NETWORKS IN TIME AND SPACE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W74-12312

STREAM FLOW CHARACTERISTICS OF: GREENBRIER RIVER SUB-BASIN,
West Virginia Dept. of Natural Resources, Charleston.
For primary bibliographic entry see Field 7C.
W74-12323

THEORETICAL JUSTIFICATION OF PEARSON DISTRIBUTION CURVES,
V. F. Kryukov.
Soviet Hydrology: Selected Papers, No 1, p 71-76, 1973. 7 ref. Translated from GGI, Sbornik rabot po gidrologii, No 10, p 110-118, 1973.

Descriptors: *Statistical models, *Mathematical studies, *Mardov processes, *Synthetic hydrology, Probability, Stochastic processes, Statistical methods, Hydrographys, Statistics, Analytical techniques, Theoretical analysis.
Identifiers: *Pearson distribution curves.

Probability distribution curves in the form of a Pearson probability curve of type III have been extensively used in Soviet hydrologic practice as a useful and flexible means of smoothing and extrapolating hydrologic distributions. The Markov distribution served as a theoretical justification of the most important types of distribution curves introduced by Pearson. The mathematical development showed that Pearson Curves can be justified theoretically and cannot be regarded only as a successful empirical means of smoothing statistical distributions. (Humphreys-ISWS)
W74-12328

METHOD FOR COMPUTING NORMAL GROUNDWATER DISCHARGE INTO SMALL RIVERS,
For primary bibliographic entry see Field 2F.
W74-12331

HYDROLOGICAL ANALYSES USING ATMOSPHERIC VAPOR DATA,
Connecticut Univ., Storrs. Inst. of Water Resources.
P. Bock, P. Magyar, and A. N. Shahane.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 077; $3.00 in paper copy, $2.25 in microfiche. Completion Report, 1974. 10 p. OWRR A-033-CONN(3). OWRR 14-31-0001-3807.

Descriptors: *Parametic hydrology, *Meteorology, *Drainage area, *Hydrologic cycle, *Statistical methods, *Computer models, Meteoric water, Precipitation(Atmospheric), Runoff, Water storage, Evapotranspiration.
Identifiers: Hydrometeorological approach, Hydrologic components, Atmospheric divergence, Atmospheric vapor.

An interdisciplinary methodology based on hydrologic, statistical and computer principles is used to demonstrate that a hydrometeorological approach can provide reasonable estimates of hydrologic components for both smaller drainage areas, varying in size from 20,000 sq. mi. to 58,000 sq. mi., and larger drainage areas, which are formed by combining individual areas in random or systematic fashion. In this way, the time series of seven hydrologic components are generated for 26 smaller and 10 larger (combined) drainage areas of the United States. These generated series of input and output quantities are further subjected to the statistical analyses which include autocorrelation analysis, spectral and cross spectral density techniques, two way analysis of variance, and simple correlation theory. The geographic distribution of statistical parameters of these hydrologic series is compared with the available maps of various meteorological and physical features. Such comparisons reflect the adequate correlation between these computed statistical parameters and physical factors. The computer simulation procedure is developed to estimate the maximum and minimum 'design' values for the seven hydrologic components of the United States. (deLara-Connecticut)
W74-12596

2B. Precipitation

SELECTED BIBLIOGRAPHY ON WATER BALANCE OF MONSOON ASIA (III),
Meteorological Research Inst., Tokyo (Japan).
I. Tsuchiya.
Available from NTIS, Springfield, Va. 22161 as N73-27531, Price $3.25 printed copy; $2.25 microfiche. Hosei University Climatological Notes, No 11, 1973. 22 p.

Descriptors: *Water balance, *Asia, *Monsoons, *Climatology, *Bibliographies, Abstracts, Wet seasons, Hydrologic budget, Hydrologic cycle.
Identifiers: *Japan, *Southeast Asia.

This bibliography of the water balance of Monsoon Asia covers Southeast Asia, Japan, and surrounding areas. The topics are climatological approaches to water balance and water resources problems. Wider regional analyses were selected from the articles on Japan. The bibliography contains 171 article references with subject annotations and 33 climatological data references. (Knapp-USGS)
W74-12019

INSTRUCTION MANUAL FOR EXPENDABLE DEW POINT HYGROMETER.
EG and G International, Inc., Waltham, Mass. Environmental Equipment Div.
Available from NTIS, Springfield, Va 22161 as AD-760 810, Price $3.00 printed copy; $2.25 microfiche. Air Force Cambridge Research Laboratories Technical Report 73-0297(11), January 1971. 50 p, 6 fig. AF F19628-69-C-0173.

Descriptors: *Meteorological data, *Humidity, *Telemetry, *Hygrometry, *Instrumentation, Automation, Moisture meters.
Identifiers: *Hygrometers.

An expendable dew point hygrometer was designed for tropospheric balloon soundings. It is designed to be used in conjunction with a radiosonde in gathering meteorological data. The measurement of dew point temperature is accomplished by a thermistor mounted in a dew point sensor which senses temperature as a resistance and provides a signal to the radiosonde. The radiosonde is a balloon-borne, battery powered, meteorological instrument that automatically transmits radio signals relating to the atmosphere pressure, air temperature and dew point temperature of the upper air to ground receiving equipment. (Knapp-USGS)
W74-12078

FOG CLEARING USING HELICOPTER DOWNDRAFTS: A NUMERICAL MODEL,
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
For primary bibliographic entry see Field 3B.
W74-12081

A PHYTOCLIMATIC APPROACH TO THE PROBLEM OF MEDITERRANEITY IN THE INDO-PAKISTAN SUB-CONTINENT,
V. M. Meher-Homji.
Feddes Repert Z Bot Taxon Geobot. Vol 83, No 9/10, p 757-788, Illus, 1973.
Identifiers: Cedrus-deodara, *Climatic conditions, *Evergreen forests, *Mediterraneity, Oleacuspidata, *Pakistan, Pistacia-khinjuk, Pistaciamutica, Punica-granatum, Quercus-baloot, Rains, Sclerophyllous, Season, Temperature, *India.

In the northwest part of the sub-continent, winter-spring rains coupled with low temperature and dry, hot summer create Mediterranean conditions. Variants may be recognized in relation to aridity, temperature of the coldest month and intensity of summer dryness based on the contribution of average summer rainfall and rainy days to the an-

nual total, percentage frequency of estival rainfall and rainy days, percentage number of years showing mediterranean regime. The degrees of Mediterraneity (pure, moderate, attenuated) recognized according to the above criteria are supported by phytogeographic evidence. Dry evergreen sclerophyllous forests, with one or more of the typical mediterranean species like Olea cuspidata, Pistacia khinjuk, P. mutica, Quercus baloot, Punica granatum, Cedrus deodara occur under a moderate degree of Mediterraneity. Some of these and few others of mediterranean stock persist under attenuated degree, though the forest physiognomy is not well developed. The floristic elements viz., Mediterranean, tropical, arid zone and general, show close correlations with the degrees of Mediterraneity, aridity and temperature regimes.--Copyright 1974, Biological Abstracts, Inc.
W74-12162

ON THE SYNTHESIS OF RANDOM FIELD SAMPLING FROM THE SPECTRUM: AN APPLICATION TO THE GENERATION OF HYDROLOGIC SPATIAL PROCESSES,
Instituto Venezolano de Investigaciones Cientificas, Caracas.
J. M. Mejia, and I. Rodriguez-Iturbe.
Water Resources Research, Vol 10, No 4, p 705-711, August 1974. 3 tab, 4 ref. NOAA Contract 2-36235, OWRR Grant 14-31-0001-9021.

Descriptors: *Synthesis, *Spatial distribution, *Frequency, *Temporal distribution, *Rainfall, Correlation analysis, Isotropy.
Identifiers: *Spectral density function, *Harmonics, Random frequencies, Ergodic, Multivariate process.

A procedure for the synthesis of processes exhibiting temporal and spatial variability was presented. The method involved the addition of harmonics of random frequencies that were sampled from the spectral density function or the radial spectral density function. The process obtained was asymptotically Gaussian and ergodic. The scheme presented can be utilized for synthetic generation of spatial processes such as rainfall. The method provides a specified way to study areal extremes in precipitation and differences with respect to point extreme rainfall. An estimate of the error in time or space averages due to the nonergodicity of the process as a function of the number of harmonics was also included. (Bhowmik-ISWS)
W74-12295

DECISION ANALYSIS OF A GAMMA HYDROLOGIC VARIATE,
Arizona Univ., Tucson. Dept. of Systems and Industrial Engineering.
S. Yakowitz, L. Duckstein, and C. Kisiel.
Water Resources Research, Vol 10, No 4, p 695-704, August 1974. 2 fig, 7 tab, 25 ref. NSF Grants GK-35791 and GK-35915.

Descriptors: *Storms, *Rainfall, *Runoff, *Decision making, *Statistical models, Simulation analysis, Monte Carlo method, Parametric hydrology, *Arizona.
Identifiers: Poisson variate, Bayesian, Exponential family, Gauss-Legendre quadrature, Gamma family, Deterministic watershed model, Winter storms, *Tucson(Ariz).

Study was devoted to the quantitative analysis of winter-type rainfall and its subsequent use in decision analysis. Results indicated that the exponential family did not statistically fit the rainfall per event in winter storms. Statistical tests indicated that the gamma family described the precipitation process of winter storms for the Tucson rainfall record. A natural conjugate family for the gamma law was derived and discussed. Numerical methods for Bayesian analysis of the gamma variate were explained and tested on simulated data. Examples of decision making when the gamma family is the underlying law were also described. The method of decision analysis presented can be applied to other hydrologic problems in which the gamma distribution, also called the Pearson type 3, is a plausible model. It was concluded that the bulk of the numerical methods derived will prove useful in many other Bayesian decision theory contexts. (Bhowmik-ISWS)
W74-12301

ACCURACY OF PRECIPITATION MEASUREMENTS FOR HYDROLOGIC MODELING,
Silver Spring, Md. National Weather Service, Hydrologic Research and Development Lab.
L. W. Larson, and E. L. Peck.
Water Resources Research, Vol 10, No 4, p 857-863, August 1974. 7 fig, 2 tab, 28 ref.

Descriptors: *Precipitation(Atmospheric), *Rain gages, *Instrumentation, Watersheds(Basins), Cyclones, Hydrologic data, Precipitation gages, Effective precipitation, Hydrologic cycle, Hydrology, Winds, Clouds, Storms.
Identifiers: *Gage shields, *Gage catch deficiencies, *Pemigewasset River Basin(NH), *Precipitation input, Meteoric water.

The use of precipitation data as input for conceptual models has enhanced the need for measurements more representative of 'true' precipitation. Precipitation input to continuous watershed models is generally some form of mean basin precipitation estimate based on point measurements. Each point measurement can have large catch deficiencies due to wind, especially for solid precipitation. A brief review was made of past results from studies concerned with these deficiencies. New curves based on current studies were presented for wind-caused gage catch deficiencies for both rain and snow. The results of using gage catch correction factors to adjust precipitation input to a conceptual hydrologic model were presented. (Roberts-ISWS)
W74-12304

THE DESIGN OF RAINFALL NETWORKS IN TIME AND SPACE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
I. Rodriguez-Iturbe, and J. M. Mejaijn.
Water Resources Research, Vol 10, No 4, p 713-728, August 1974. 12 fig, 9 tab, 23 ref. NOAA Contract 2-36235.

Descriptors: *Rainfall, *Networks, *Design, Time, Water resources, Planning, Management, Water balance, Hydrologic budget, Equations, Mathematical studies, Cyclones, Probability, Hydrologic data, Precipitation(Atmospheric), Networks.
Identifiers: *Spatial sampling, *Variance reduction factor, *Covariance function, Random design, Bessel-Type correlation, Areal mean, Long-Term mean, Areal rainfall, Space, Rainfall process, Development.

A methodology for the design of precipitation networks was formulated. The network problem was discussed in its general conception and then focus was made on networks to provide background information for the design of more specific gaging systems. The rainfall process was described in terms of its correlation structure in time and space. A general framework was developed to estimate the variance of the sample long-term mean areal precipitation and mean areal rainfall of a storm event. The variance was expressed as a function of correlation in time, correlation in space, length of operation of the network, and geometry of the gaging array. The trade of time versus space was quantitatively developed, and realistic examples were worked out showing the influence of the network design scheme on the variance of the estimated values. (Roberts-ISWS)
W74-12312

HYDROLOGICAL ANALYSES USING ATMOSPHERIC VAPOR DATA,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 2A.
W74-12596

METEOROLOGICAL CRITERIA FOR EXTREME FLOODS FOR FOUR BASINS IN THE TENNESSEE AND CUMBERLAND RIVER WATERSHEDS,
National Weather Service, Silver Spring, Md. Hydrometeorological Branch.
F. K. Schwarz.
Available from Sup Doc, GPO, Washington, D C 20402, Price $0.90 domestic postpaid; $0.65 GPO Bookstore. National Oceanic and Atmospheric Administration Hydrometeorological Report No 47, May 1973. 59 p, 27 fig, 13 tab, 8 ref. TVA Contract TV-36522A.

Descriptors: *Floods, *Maximum probable flood, *Tennessee Valley Authority, Reservoirs, *Tennessee River, Flood forecasting, Rainfall-runoff relationships, Probable maximum precipitation, Weather patterns.
Identifiers: *Cumberland River(Tenn).

Rainfall criteria are given which permit definition of maximum flood levels along the Tennessee River from the mouth upstream to TVA's Browns Ferry Nuclear Plant at mile 294. In 1968 maximum rainfall depths were defined for the 16,170-sq-mi drainage area above the Browns Ferry plant and below TVA's major tributary dams. In 1970 the study was extended to include the 26,780-sq-mi drainage area above Kentucky Dam and below TVA's major tributary dams. This latter study included definition of concurrent rainfall expected on the Cumberland Basin as required to evaluate the effects of the canal which connects the two rivers just upstream of Kentucky Dam. Studies were made in 1971 to provide rainfall criteria for defining maximum flood levels along the Cumberland River above Old Hickory Dam. This required defining rainfall for both the 11,674-sq-mi drainage area above the dam and the 2,734-sq-mi watershed between Old Hickory and the next major upstream dams, Center Hill, Dale Hollow, and Wolf Creek. (Knapp-USGS)
W74-12636

RELATION OF CLIMATE TO LEACHING OF SOLUTES AND POLLUTANTS THROUGH SOILS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W74-12645

INTERCEPTION OF RAINFALL BY HARD BEECH (NOTHOFAGUS TRUNCATA) AT TAITA, NEW ZEALAND,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Soil Bureau.
R. Aldridge, and R. J. Jackson.
N Z J Sci. Vol 16, No 1, p 185-198. 1973. Illus.

Descriptors: *Stemflow, Throughfall, Rainfall, *Precipitation(Atmospheric), Soil moisture.
Identifiers: *Beech, Fagus-spp, Flow, *New Zealand, Nothofagus-truncata, Stem, Taita, Winter, Fagus.

Throughfall and stemflow were measured in a stand of hard beech 100-120 yr old and 10-15 m tall. Throughfall commenced when gross rainfall exceeded 0.5 mm. For storms with gross rainfall greater than 10 mm, 45-50% of it reached the ground as throughfall. The presence of scars resulting from fires made most trunks unsuitable for stemflow measurement, but data were obtained from 2 trunks with breast-height diameter (d.b.h.) 0.25 m and one with 0.6 m d.b.h. Stemflow commenced when gross rainfall exceeded 1.3 mm. For storms with gross rainfall greater than 10 mm,

stemflow was 20-25% and 10-15% of gross rainfall from the small and large trees respectively. Stemflow was greater when rain was accompanied by strong winds than in storms with light winds. The proportion of gross rainfall reaching the ground as stemflow is similar to that found in studies on beech (Fagus) species in the Northern Hemisphere. Significant effects of stemflow on soil moisture distribution and on soil properties are expected. In winter the interception loss was much greater than conventional estimates of potential evapotranspiration.--Copyright 1974, Biological Abstracts, Inc.
W74-12683

2C. Snow, Ice, and Frost

STRENGTH CALCULATIONS OF ICE COVER,
D. F. Panfilov.
Available from NTIS, Springfield, Va. 22161 as AD-762 105, Price $3.00 printed copy; $2.25 microfiche. Army Foreign Science and Technology Center Translation, March 1973. 9 p, 2 fig, 1 tab, 18 ref. (Trans. from Stroitel'stvo i Arkhitekturz, Vol 6, p 128-133, 1970).

Descriptors: *Ice, *Ice cover, *Strength of materials, *Mohr failure theory, Rivers, Lake ice, Failure(Mechanics), Theoretical analysis.

When the ice cover of rivers and inland waters is used for construction, exploration, and transportation, it is necessary to calculate its carrying capacity. Ice at any temperature fails as a brittle material. The equations given are applicable only at below-freezing ambient air temperatures. With the onset of thaw, the ice becomes weakened, and its carrying capacity is reduced. (Knapp-USGS)
W74-12010

UNITED STATES GEOLOGICAL SURVEY ALASKA PROGRAM, 1974.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-12012

CHARACTERISTICS OF SEA ICE, LAKE ICE AND PERMAFROST USING AN IMPULSE RADAR SYSTEM,
Geophysical Survey Systems, Inc., Worth Billerica, Mass.
C. L. Bertram, K. J. Campbell, and S. S. Sandler.
Available from NTIS, Springfield, Va 22161 as AD-772 549, Price $4.00 printed copy; $2.25 microfiche. Technical Report No 008-72, May 1972. 65 p, 33 fig, 3 tab, 7 ref. ONR Contract N00014-71-C-0392.

Descriptors: *Radar, *Ice, *Permafrost, Sounding, Instrumentation, Frozen ground, Frozen soils, Ice cover, Frost, Sea ice, Iced lakes, Surveys.

An impulse radar system was developed to perform shallow subsurface investigations. The technique, known as Electromagnetic Subsurface Profiling, is the electrical analog of the seismic subbottom profiling method used in marine geology. The radar system operates by detecting the interface between two materials having different electrical properties. For sea ice and lake ice, an electromagnetic pulse is generated near the ice surface and the reflections from the surface and the ice-water interface are displayed on a continuous strip-chart recorder. Travel times of the reflected pulses can be converted directly to ice thickness if the effective dielectric constant is known. Likewise, if the ice thickness is known the effective dielectric constant can be determined. Large masses of ground ice in permafrost have been located with the system. Theoretical considerations indicate that the system also should be able to determine the approximate volume of interstitial ice in frozen soils. (Knapp-USGS)
W74-12053

THE INTERDEPENDENCE OF LAKE ICE AND CLIMATE IN CENTRAL NORTH AMERICA,
Wolf Research and Development Corp., Riverdale, Md.
A. J. Jelacic.
Available from NTIS, Springfield, Va 22161 as E74-10149, Price $3.75 printed copy; $2.25 microfiche. Contract Report for Goddard Space Flight Center, December 1973. 27 p, 6 fig, 3 tab, 8 ref. NASA Contract NAS-5-21761.

Descriptors: *Lake ice, *Ice cover, *Freezing, *Climatology, *Remote sensing, Satellites(Artificial), Surveys, Meteorology, Synoptic analysis, Canada, United States, North America.

Correlations between the freeze-thaw cycles of lakes and regional weather variations were studied using ERTS 1 imagery of central Canada and north central United States. A comparison of lake freeze transition zone migration with the movement of large pressure centers revealed the following consistencies: (1) polar continental cyclones originate within and/or travel along the trend of the transition zone; (2) polar continental anticyclones fail to cross the transition zone, and (3) polar outbreak anticyclones pass through the transition zone, apparently unaffected. In addition, storm centers associated with the transition zone undergo significant intensification manifest by a deepening of the pressure through and increased precipitation outside the zone. (Knapp-USGS)
W74-12074

RESISTANCE TO FLOW IN ICE COVERED RIVERS--A SIMULATION STUDY WITH ARTIFICIAL ROUGHNESS,
New Brunswick Univ., Fredericton.
For primary bibliographic entry see Field 8B.
W74-12092

HYDRAULIC INFLUENCES ON AUFEIS GROWTH,
R. F. Carlson, and D. L. Kane.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 165-175, 1973. 5 fig, 5 ref.

Descriptors: *Ice, *Alluvial channels, Freezing, *Alaska, Roads, Highways, Design, Surface-groundwater relationships, Groundwater movement.
Identifiers: *Icings, *Aufeis growth, *Naleds.

The hydraulic mechanism of aufeis growth is the result of a complex interaction of open channel, closed conduit, and groundwater flow. Results of a field measurement program on a small stream near Fairbanks, Alaska illustrate rapid and complicated fluctuation of hydrostatic head in the stream and the adjacent groundwater aquifer in conjunction with aufeis growth. A very important role is played by the adjacent groundwater aquifer as a storage reservoir. An understanding of the interaction of groundwater and streamflow is necessary for the development of design criteria where various transportation facilities intersect streams that have a potential for aufeis accumulation. (See also W74-12087) (Knapp-USGS)
W74-12095

SNOW-AIR INTERACTIONS AND MANAGEMENT OF MOUNTAIN WATERSHED SNOWPACK,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
J. R. Meiman, and L. O. Grant.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 825 $3.25 in paper copy, $2.25 in microfiche. Completion Report Series No. 57, Colorado Environmental Resources Center, Fort Collins, June 1974, 36 p. 3 fig, 6 tab, 11 ref, append. OWRT-B-073-Colo, 14-31-0001-3568.

Descriptors: Evaporation, *Snow management, Alpine, *Snowpack, *Cirques, Watershed management, Rocky Mountain region, Colorado, Avalanches, *Hydrologic budget.
Identifiers: *Colorado Front Range, Climax(Colo.), Pingree Park(Colo.), Induced avalanching, Cornice blasting.

Evaporation losses from mountain snowpacks amounted to approximately 60% of the snow season precipitation in an alpine setting and to approximately 45% in both a forest opening. Forest clearings similar to those studied should not result in greater snow evaporation losses if they are kept small enough to prevent wind transport of snow. Periodic removal of ridgeline snow deposits into the cirque below resulted in an increase of water yield equivalent to 240 acre-feet of water per mile of ridgeline treated. The estimated cost of the increased runoff was approximately $50 per acre-foot discharged from the cirques. A water-budget analysis of the alpine feeder area indicated that nearly 80% of the seasonal precipitation was transported out of the region by the end of the winter study period, 30 April. Only 23% of this total transport (18% of seasonal precipitation was caught in the natural cornice deposits along the ridgeline. It was shown that the cornice location is an inefficient place to store the windblown snow. Less than one-third of the winter storage in these ridgeline deposits was available for runoff. The remaining two-thirds was lost to either evapo-sublimation or late melt occurring after the runoff from the cirques had ceased. In the study area there is no carry-over of the ridgeline deposits into the next season. The water-budget analyses for the cirques indicated that nearly 75% of the water stored in the cirques during the winter period was realized as runoff during the melt period.
W74-12201

ENVIRONMENTAL GUIDELINES FOR DEVELOPMENT ROADS IN THE SUBARCTIC,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5G.
W74-12223

TRANSVERSE MIXING IN AN ICE-COVERED RIVER,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-12293

A TECHNIQUE TO OBTAIN ICE MOVEMENT,
Alaska Univ., College. Geophysical Inst.
G. Wendler, and K. O. L. F. Jayaweera.
Journal of Geophysical Research, Vol 79, No 24, p 3478-3479, August 20, 1974. 1 fig, 1 ref. NOAA, sea-grant 04-3-158-41.

Descriptors: *Sea ice, *Remote sensing, *Surveys, *Velocity, Icebergs, Sea water, Satellites(Artificial), Data collections, Photography, Analytical techniques, Measurement, Evaluation, Movement.
Identifiers: *Norton Sound(Bering Sea).

A technique of using satellite imagery was presented so as to obtain without ambiguity the velocity vector of sea ice movement. The satellite imagery of the same area at two different times, i.e., a 24-hour difference was subtracted by superimposing a positive transparency of one and the negative of the other. Ice floes that have moved appeared on the resultant imagery twice, one lighter and one darker than the background. (Humphreys-ISWS)
W74-12314

DEPENDENCE OF PHOTOSYNTHESIS ON TEMPERATURE IN TUNDRA PLANTS OF WRANGEL ISLAND, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningard. Botanicheskii Institut.
For primary bibliographic entry see Field 2I.
W74-12481

CAN FREEZING IMPROVE WELLS IN CONSOLIDATED ROCK AQUIFERS,
Food and Agriculture Organization of the United Nations, Rome (Italy). Land and Water Development Div.
For primary bibliographic entry see Field 4B.
W74-12532

2D. Evaporation and Transpiration

EXPLANATION OF THE DAILY PATTERN OF WATER EVAPORATION FROM THE SOIL,
Zh.-D. Dandaron.
Soviet Hydrology: Selected Papers, No 1, p 77-85, 1973. 4 fig, 2 tab, 8 ref. Translated from GGI, Sbornik rabot po gidrologii, No 10, p 188-200, 1973.

Descriptors: *Evaporation, *Soil moisture, *Air-earth interfaces, *Diurnal distribution, Soil water movement, Soil surfaces, Hygroscopic water, Boundary processes, Diffusion, Temperature, Soil profile, Hydrologic equation, Hydrology, Fringe water, Soil temperature, On-site investigations, On-site tests, Soil investigations.
Identifiers: USSR.

An equation to compute the daily pattern of evaporation from the soil was obtained by solving a diffusion equation with allowance for sorption and desorption taking place during temperature changes in a dry layer formed at the soil surface. At the limit, when the thickness of the dry layer approaches zero, the equation leads to the formula of evaporation from the water surface (moist soil). Water evaporation from the soil represented a superposition of the diffusion flux, across the dry layer, of the vapor formed in deeper layers, and vapor formed or adsorbed in the dry layer as a result of desorption and sorption, respectively. The thickness of the dry soil layer was one of the most important parameters determining the daily evaporation pattern. With a thin dry layer, the evaporation pattern was determined mainly by the diffusion of vapor forming in the deeper soil layers. With a thick dry layer, the evaporation pattern was determined chiefly by sorption and desorption in this layer during periodic changes in soil temperature. The daily pattern of evaporation from the soil, computed by the equation agrees satisfactorily with the data from a hydraulic evaporimeter. (Humphreys-ISWS)
W74-12330

TREE WATER STRESS IN RELATION TO WATER YIELD IN A HARDWOOD FOREST,
New Hampshire Univ., Durham. Water Resource Research Center.
C. A. Federer, and G. W. Gee.
Available the from National Technical Information Service, Springfield, Va 22161 as PB-236 047, $3.25 in paper copy, $2.25 in microfiche. Research Report No 7, July 1974, 30 p, 1 fig, 1 tab, 12 ref. OWRT A-025-NH(3), 14-31-0001-3229.

Descriptors: *Stomata, *Transpiration, Microenvironment, Moisture deficit, *Deciduous forests, *Hardwood, Water yield improvement, *Energy budget, Xylem, *New Hampshire, Trees, Soil-water-plant relationships, Leaves.
Identifiers: *Ephemeral, Single-leaf energy balance.

Stomatal resistance, xylem potential, soil-water potential, stem diameter, net radiation, air temperature, humidity and wind were measured through a summer in a northern hardwood forest and on sunny and shady edges of clearings. Rainfall was about normal, and stomatal closure due to water stress occurred only as an ephemeral midday phenomenon. Yellow birch had lower diffusion resistance (2.5 sec/cm) than beech and sugar maple (3.0 and 3.4), implying possible transpirational differences. Diffusion resistance varied by species during leafout; it remained low in autumn until leaves turned color. Several trees were artificially stressed by preventing rain from reaching their roots; after two weeks stomata began to close early in the day, presumably limited transpiration and growth. The single-leaf energy balance was found to work on leaves in the canopy within the limits of measuring accuracy. Transpiration of trees on the edges of forest openings is probably greater than if there were no opening due to increased radiation and clothesline advection. A single large clearcut will reduce evapotranspiration more and provide greater water yield increase than cutting the same forest area in a number of smaller blocks.
W74-12362

EFFECT OF PARTIAL VEGETATION AND TOPOGRAPHIC SHADE ON RADIANT ENERGY EXCHANGE OF STREAMS--WITH APPLICATIONS TO THERMAL LOADING PROBLEMS,
Pennsylvania State Univ., University Park. School of Forest Resources.
D. R. DeWalle.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 073; $4.50 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Research Publication Number 82, June 1974. 105 p, 16 figs, 11 tab, 17 ref. OWRT B-043-PA(1). 14-31-0001-3637.

Descriptors: *Solar radiation, *Thermal radiation, *Vegetation effects, Topography, *Water temperature, Streams, *Heat budget, *Thermal pollution, Model studies.

A model was developed and tested for estimation of the effects of partial vegetative and topographic shade on radiation exchange of streams. Theoretical shade effects on direct solar, diffuse solar, reflected solar, transmitted solar radiation, and both terrestrial and atmospheric longwave radiation were analyzed. Theoretical and measured downward allwave radiation flux densities compared favorably for a stream partially shaded by vegetation during four summer days. Theory and measurements were used to estimate daily and diurnal shade effects on radiation exchange of streams. Maximum shade-induced reductions in daily absorbed solar plus downward longwave radiation occurred for N-S stream azimuths, clear days, and large shade altitudes. Reductions were negligible on streams large enough to be sinks for waste heat, but could be significant on small streams especially if diurnal variations in radiation exchange were considered. Shade effects on heat dissipation from thermally-loaded streams were inferred from heat balance data.
W74-12598

INTERCEPTION OF RAINFALL BY HARD BEECH (NOTHOFAGUS TRUNCATA) AT TAITA, NEW ZEALAND,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Soil Bureau.
For primary bibliographic entry see Field 2B.
W74-12683

LOSSES OF NITROGEN AND OTHER PLANT NUTRIENTS TO DRAINAGE FROM SOIL UNDER GRASS,
Grassland Research Inst., Hurley (England).
For primary bibliographic entry see Field 5B.
W74-12723

2E. Streamflow and Runoff

HYDROLOGIC DATA FOR LITTLE ELM CREEK, TRINITY RIVER BASIN, TEXAS, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-12055

DRAINAGE AREAS OF TEXAS STREAMS, GUADALUPE RIVER BASIN.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-12060

FLOW VISUALIZATION USING A SELECTIVITY SENSITIVE FLUORESCENT DYE,
Aerospace Research Labs., Wright-Patterson AFB, Ohio.
D. R. Campbell.
Available from NTIS, Springfield, Va 22161 as AD-761 499, Price $3.00 printed copy; $2.25 microfiche. Air Force Aerospace Research Laboratories Report ARL 73-0075, May 1973. 8 p, 4 fig, 3 ref.

Descriptors: *Tracers, Flow, *Flourescent dye, *Tracking techniques.
Identifiers: *Flow visualization.

A technique of flow visualization produces the equivalence of smoke lines in water. The method consists of a fluorescent dye material, acting as a marker fluid, which is selectively responsive to ultraviolet light of a single wavelength. Under proper illumination, the dye provides a highly visible marker fluid, well suited to conventional photography. Under normal lighting conditions, the dye is colorless and optically noncontaminating. (Knapp-USGS)
W74-12080

FIRST CANADIAN HYDRAULICS CONFERENCE PROCEEDINGS.
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-12087

BACKWATER EFFECTS AT END-DUMPED CONSTRICTIONS ON ALLUVIAL CHANNELS,
Directorate of Designs, Irrigation, Bhubaneswar (India).
For primary bibliographic entry see Field 8B.
W74-12088

NUMERICAL MODEL STUDIES OF RIVERS AND ESTUARIES,
National Research Council of Canada, Ottawa (Ontario). Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-12101

A NUMERICAL MODEL FOR FLOW PAST A SPUR-DIKE,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-12103

MULTIPURPOSE WATER RELATED DEVELOPMENT IN URBAN AREAS,
California Univ., Berkeley. Hydraulics Lab.
For primary bibliographic entry see Field 4A.
W74-12226

SEQUENTIAL GENERATION OF STREAMFLOW,
Indian Inst. of Tech., New Delhi. Dept. of Civil Engineering.
S. K. Spolia, and S. Chander.

Water Resources Bulletin, American Water Resources Association, Vol 10, No 4, p 672-679, August 1974. 3 tab, 6 ref.

Descriptors: *Time series analysis, *Model studies, *Synthetic hydrology, Streamflow, Statistical methods, Hydrologic data, Analytical techniques, Correlation analysis, Probability, Average flow.
Identifiers: Residual series, Monthly streamflow, *India(Beas River).

An auto-regressive model was developed for hydrologic data simulation by transforming the observed monthly streamflows into a single residual series. The model developed was used for synthesizing 10 sequences, each of 100 year length, of monthly flows for the Beas River in India. The statistical parameters were calculated from the 49 year historical record of monthly streamflows. Sequences were also generated using the conventional auto-regressive model and an individual monthly streamflow series. A comparison of the sequences shows that the model developed and proposed in this paper is as good as the conventional auto-regressive model in preserving the mean and standard deviation of historical record. The proposed model requires less parameters than the conventional model for simulation of long-term dependence. (Singh-ISWS)
W74-12281

TWO-DISTRIBUTION METHOD FOR MODELING AND SEQUENTIAL GENERATION OF MONTHLY STREAMFLOWS,
Illinois State Water Survey, Urbana. Hydrology Section.
K. P. Singh, and C. G. Lonnquist.
Water Resources Research, Vol 10, No 4, p 763-773, August 1974. 6 fig, 2 tab, 21 ref.

Descriptors: *Synthetic hydrology, *Time series analysis, *Model studies, *Distribution patterns, Statistical methods, Streamflow, Hydrologic data, Analytical techniques, Correlation analysis, Probability, Computer programs, *Illinois.
Identifiers: Mixed distributions, *Sangamon River(Ill), *Two-distribution method, Random normal deviates, Sequential flow generation, Normal distribution, Pearson distribution.

Distributions of observed monthly streamflows at many gaging stations exhibit slight, moderate, or sharp reverse curvatures that cannot be accommodated by the commonly used classical distributions such as the normal and gamma (Pearson type 3) distributions applied to flows or their logarithms. The two distribution, essentially a bimodal distribution, fits most of these observed distributions very well. A unique and versatile method for modeling and sequential generation of monthly streamflows was presented. In order to assure the normality of the multivariate distribution of variables representing monthly flows, the flows or their logarithms were converted to standardized normal deviates by suitable transforms. The distributions of monthly streamflows generated by the two-distribution method fit best the observed flow distributions. Annual flows obtained by summing generated monthly flows fit the observed annual flows very well. The use of the two-distribution method can obviate arbitrary adjustments in generated monthly flows to bring the annual flows obtained from them in line with observed annual flows. (Singh-ISWS)
W74-12283

BASSETT CREEK WATERSHED MODEL,
Barr Engineering Co., Minneapolis, Minn.
For primary bibliographic entry see Field 2A.
W74-12285

THE APPLICATION OF RIDGE REGRESSION ANALYSIS TO A HYDROLOGIC TARGET-CONTROL MODEL,
Wyoming Univ., Laramie. Dept. of Statistics and Atmospheric Resources.
D. A. Anderson, and R. G. Scott.
Water Resources Bulletin, American Water Resources Association, Vol 10, No 4, p 680-690, August 1974. 1 fig, 2 tab, 10 ref. DOI 14-06-D-6801.

Descriptors: *Regression analysis, *Statistical methods, *Least squares method, Hydrographs, Hydrologic data, Gaging stations, Analytical techniques, Variability, Estimating, *Wyoming.
Identifiers: *Wind River Range(Wy), *Ridge regression analysis, Regression coefficients.

The results of this study indicated not only improved stability of the regression estimates but also some improvement in predictive ability when ridge regression is used instead of ordinary regression analysis. In situations where the independent variables in a model are highly correlated with each other, ordinary regression analysis is not usually satisfactory. With nonorthogonal data, the least squares estimates obtained using the regression techniques are subject to large errors and instability. In 1970, Hoerl and Kennard proposed the ridge regression analysis to control the instability of least squares estimates. This analysis is based on decreasing the mean square error of the regression coefficients rather than on a minimum residual sum of squares for the ordinary regression analysis. A detailed computational procedure was presented for obtaining the ridge regression estimates. The proposed analysis has been used to investigate the stability of regression coefficients over 23 years of data collection from several control stations for estimating the streamflow at two target stations. The ordinary regression analysis yielded positive and negative regression coefficients, but the ridge regression analysis gave only positive regression coefficients. The regression coefficients were very nearly the same for different sets of years using the ridge regression analysis. (Singh-ISWS)
W74-12286

PROCEDURES FOR FILLING GAPS IN HYDROLOGIC EVENT SERIES,
Pennsylvania State Univ., Harrisburg. Dept. of Civil Engineering.
G. Aron, and T. M. Rachford.
Water Resources Bulletin, Vol 10, No 4, p 719-727, August 1974. 5 fig, 5 tab, 2 ref.

Descriptors: *Synthetic hydrology, *Analytical techniques, *Flood frequency, Simulation analysis, Statistical methods, Floods, Statistics, Hydrologic data, Surface waters, Hydrology, Flood data, Annual flood, Flood discharge, Regression analysis.
Identifiers: Missing data, Beard's formula, Extending records.

Various methods for synthesizing missing records of floods were compared. Record gaps may be the result of a temporary interruption of gaging activities at the particular site or may constitute the years prior to the installation of a permanent gage, during which a few isolated measurements of exceptional flood stages were made. The rank adjustment method was used to compute synthetic floods when concurrent records were absent from gauges located on the same stream or a nearby watershed. For concurrent data available at two hydrologically related stream gauges, synthetic floods were computed by regression analysis and the rank matching method. It was recommended that regression analysis be used if the series were processed in a form ready for computer analysis. The rank matching method can be applied quickly without any statistical analysis and could be used with little loss in realiability if hand tabulation and plotting are used in the flood analysis. It may also be possible to obtain better results with the rank matching method by interpolating according to the geometric mean, or by a weighted interpolation of several adjacent flows, or some other scheme, but only with the penalty of additional computational effort. (Humphreys-ISWS)
W74-12291

TRANSVERSE MIXING IN AN ICE-COVERED RIVER,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
J. E. O. Engmann, and R. Kellerhals.
Water Resources Research, Vol 10, No 4, p 775-784, August 1974. 7 fig, 4 tab, 16 ref, 1 append.

Descriptors: *Mixing, *Ice cover, *Tracers, Fluorescent dye, Streamflow, Hydraulics, Flow characteristics, *Canada.
Identifiers: *Transverse mixing, *Alberta(Lesser Slave River), Velocity measurements, Meandering channels.

Two tracer tests were conducted in Lesser Slave River in Alberta under similar conditions of flow depth, one under ice and the other under open water. Average transverse exchange (or mixing) coefficients for a reach were computed using a curvilinear coordinate system and the moments technique of Aris. The normalized exchange coefficient for ice-covered conditions was found to be approximately 50% smaller than the corresponding coefficient for open water conditions. Since ice cover reduces the product of friction velocity and hydraulic radius by a factor of approximately 2.83 if depth remains constant, these results indicated that ice cover can substantially reduce the mixing capacity of a river. The importance of depth and width variations in the computation of mixing coefficients was discussed and demonstrated. Bend-induced spiral motions appeared to delay vertical mixing until transverse mixing was completed. (Adams-ISWS)
W74-12293

ON THE SYNTHESIS OF RANDOM FIELD SAMPLING FROM THE SPECTRUM: AN APPLICATION TO THE GENERATION OF HYDROLOGIC SPATIAL PROCESSES,
Instituto Venezolano de Investigaciones Cientificas, Caracas.
For primary bibliographic entry see Field 2B.
W74-12295

ADJUSTMENT OF RIVER CHANNEL CAPACITY DOWNSTREAM FROM A RESERVOIR,
Exeter Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 4A.
W74-12298

THE KERNEL FUNCTION OF LINEAR NONSTATIONARY SURFACE RUNOFF SYSTEMS,
Technion - Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
M. H. Diskin, and A. Boneh.
Water Resources Research, Vol 10, No 4, p 753-761, August 1974. 9 fig, 2 tab, 11 ref.

Descriptors: *Surface runoff, *Hydrographs, *Optimization, *Storms, Base flow, Rainfall-runoff relationships.
Identifiers: *Linear nonstationary model, *Stationary linear model, *Kernel function, Impulse response functions, Discretization scheme, Independent subsets, Natural watersheds, Convolution integral, Cache River at Forman.

Representation of surface runoff systems by a nonstationary linear model gave a closer fit to a set of observed direct surface runoff hydrographs than representation by a stationary linear model. The kernel of this model, which is a function of two time variables, was considered to be an assembly of impulse response functions for unit pulses acting at various time intervals after the beginning of the storm. Each of these impulse

response functions must have the properties of an ordinary instantaneous unit hydrograph. The kernel function was evaluated by an optimization procedure based on a discretization scheme for the functions involved. The set of equations for the unknown kernel values was partitioned into independent subsets, each of which was solved individually. The complete equation set needs consideration only when area constraints of the kernel function are imposed. (Bhowmik-ISWS)
W74-12302

STREAM FLOW CHARACTERISTICS OF: GREENBRIER RIVER SUB-BASIN,
West Virginia Dept. of Natural Resources, Charleston.
For primary bibliographic entry see Field 7C.
W74-12323

A SUBSURFACE RIBBON OF COOL WATER OVER THE CONTINENTAL SHELF OFF OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
A. Huyer, and R. L. Smith.
Journal of Physical Oceanography, Vol 4, No 3, p 381-391, July 1974. 9 fig, 1 tab, 29 ref. NSF Grants GX-28746 and GX-33502.

Descriptors: *Oregon, *Continental helf, *Ocean currents, *Surveys, Oceans, Oceanography, Pacific Ocean, Upwelling, Hydrography, Exploration, On-site data collections, Temperature, Salinity, Evaluation.
Identifiers: Coastal upwelling experiment.

Observations of the hydrographic regime over the continental shelf off Oregon from the R/V Yaquina during the summer of 1972 showed the presence of an alongshore, subsurface ribbon of relatively cool water. Its properties and its evolution during the 1972 season were described. Examination of earlier observations showed that evidence of the ribbon was found during the upwelling season in almost every year between 1961 and 1971. It was usually observed when the upwelling index (the monthly mean Ekman transport directed offshore) was high. The ribbon can be accounted for by southward advection of subarctic water due to the coastal jet associated with upwelling. A warm temperature anomaly, occurring at somewhat higher salinity, was frequently observed inshore of the ribbon. (Humphreys-ISWS)
W74-12324

LAGRANGIAN MEASUREMENTS IN A COASTAL UPWELLING ZONE OFF OREGON,
Inter-American Tropical Tuna Commission, La Jolla, Calif.
M. R. Stevenson, R. W. Garvine, and B. Wyatt.
Journal of Physical Oceanography, Vol 4, No 3, p 321-336, July 1974. 13 fig, 5 tab, 13 ref. NSF Grant GX-32211.

Descriptors: *Oregon, *Coasts, *Upwelling, *Ocean currents, *On-site investigations, Ocean circulation, Oceanography, Hydrography, Temperature, Salinity, Measurement, Evaluation.
Identifiers: *Upwelling circulation, Lagrangian measurements, Coastal upwelling experiment.

During August 1972 drogue and hydrographic measurements were made in the coastal upwelling zone off the Oregon coast. The study was conducted as a component of the Coastal Upwelling Experiment (CUE-1). Both sub-surface parachute drogues and surface vane drogues were tracked for two periods. The one experiment began as the strong prevailing northerlies that drive the summer upwelling began after a cessation of 11 days. A new cycle of upwelling appeared to begin with progressive upwarping of the pycnocline inshore and the generation of strong surface equatorward motion. The other experiment coincided with the abrupt relaxation of strong northerlies and appeared to represent the onset of the decay phase of the upwelling circulation. The pycnocline broke the sea surface about 5 km from shore creating a highly convergent front which drew in the surface vane drogues. A strong sub-surface temperature inversion appeared to be related to intense sinking of surface water at the front. The onshore motion of drogues at 50 m depth gave evidence of persistent upwelling, despite the wind relaxation. A conceptual model of the two phases of upwelling circulation observed was presented. (Humphreys-ISWS)
W74-12325

THEORETICAL JUSTIFICATION OF PEARSON DISTRIBUTION CURVES,
For primary bibliographic entry see Field 2A.
W74-12328

THE POTENTIAL OF METEOROLOGICAL SATELLITE CLOUD OBSERVATIONS FOR DELINEATION OF SIGNIFICANT FEATURES OF COASTAL UPWELLING OFF OREGON,
Earth Satellite Corp., Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-12338

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA, VOLUME 1, REPORT,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 8A.
W74-12340

THE BOSPORUS,
Stanford Research Inst., Irvine, Calif.
For primary bibliographic entry see Field 2L.
W74-12372

EXPEDITION 'ODYSSEUS 65': RADIOCARBON AGE OF BLACK SEA DEEP WATER,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
H. G. Ostlund.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 127-132, 1974. 3 fig, 2 tab, 12 ref. NSF Grant GP-4783.

Descriptors: *Water circulation, *Sea water, *Radioactive dating, Carbon radioisotopes, Currents(Water), Advection, Stratification, Thermocline, Dissolved oxygen, Density stratification.
Identifiers: *Black Sea.

Radiocarbon data from the deep water of the Black Sea indicate a mean residence time of the water of 935 years. It is proposed that about half of the inflow from the Mediterranean is advected to the surface and only half of it participates in forming the deep water. Bottom waters are 2,000 plus or minus 200 years old. (Knapp-USGS)
W74-12374

REPORT OF THE RIVER MASTER OF THE DELAWARE RIVER FOR THE PERIOD DECEMBER 1, 1972 - NOVEMBER 30, 1973.
Office of Delaware River Master, Milford, Pa.
For primary bibliographic entry see Field 4A.
W74-12634

CALCULATION OF WATER TEMPERATURE OF RIVERS,
Moncton Univ. (New Brunswick). Dept. of Engineering.
For primary bibliographic entry see Field 7B.
W74-12707

2F. Groundwater

HYDROLOGIC CONSEQUENCES OF USING GROUNDWATER TO MAINTAIN LAKE LEVELS AFFECTED BY WATER WELLS NEAR TAMPA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4B.
W74-12013

DEVELOPMENT OF WATER FROM FRACTURED CRYSTALLINE ROCKS, REPUBLIC OF KOREA,
Ministry of Construction, Seoul (Republic of Korea).
For primary bibliographic entry see Field 4B.
W74-12018

GROUNDWATER RESOURCES OF THE HOLLYWOOD AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4B.
W74-12054

GROUNDWATER RESOURCES OF YELLOW CREEK STATE INLAND PORT AREA, TISHOMINGO COUNTY, MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 4B.
W74-12059

HYDROGEOLOGIC DATA FROM GREELEY, WICHITA, SCOTT AND LANE COUNTIES, KANSAS,
Geological Survey, Garden City, Kan.
For primary bibliographic entry see Field 4B.
W74-12068

THE SHALLOW FRESH-WATER SYSTEM OF SANIBEL ISLAND, LEE COUNTY, FLORIDA, WITH EMPHASIS ON THE SOURCES AND EFFECTS OF SALINE WATER,
Geological Survey, Tallahassee, Fla.
D. H. Boggess.
Florida Bureau of Geology, Tallahassee Report of Investigation No 69, 1974. 52 p, 23 fig, 2 tab, 3 ref.

Descriptors: *Surface-groundwater relationships, *Hydrogeology, *Florida, *Saline water intrusion, Water resources, Water quality, Hydrologic data, Data collections, Artesian aquifers.
Identifiers: *Sanibel Island(Fla).

The freshwater system of Sanibel Island, Florida, includes the water-table aquifer and the hydraulically connected surface network of streams, ponds, lakes, and canals in the interior of the island. Beneath the water-table aquifer, a shallow artesian aquifer occurs at depths ranging from about 29 to 34 feet below land surface and probably extends to depths of more than 100 feet. Within the shallow artesian aquifer, water levels respond to the loading and unloading of tides in the Gulf of Mexico. The tidal efficiency of wells tapping this aquifer range from about 10% to 77%. Chloride concentrations in the water-table aquifer range from 12 to 23,200 milligrams per liter; concentrations are highest in or adjacent to the salt-marsh areas along the north half of the island. Within the shallow artesian aquifer, the chloride concentrations range from 2,250 to 30,900 mg/liter; concentrations are highest under the north half of the island. Most of the problems caused by intrusion of saline water into the interior freshwater system can be resolved. The inland movement of saline water through the Sanibel River from adjacent tidal water bodies could largely be averted if the control structures were modified to prevent being topped by high tides. Dewatering of excavations should be restricted to those areas where no freshwater occurs within the water-table aquifer. Excavations should be limited

to depths which will not improve the hydraulic connection between the water-table and shallow artesian aquifers. All wells or test holes which penetrate any of the artesian aquifers should be plugged with cement after serving their purpose. (Knapp-USGS)
W74-12071

HYDRODYNAMICS OF ARTIFICIAL GROUNDWATER RECHARGE,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4B.
W74-12195

TRACING SHALLOW GROUNDWATER SYSTEMS BY SOIL TEMPERATURES,
Illinois State Geological Survey, Urbana.
K. Cartwright.
Water Resources Research, Vol 10, No 4, p 847-855, August 1974. 9 fig, 23 ref.

Descriptors: *Illinois, *Groundwater movement, *Soil temperature, *Heat flow, Dishcarge(Water), Recharge, Aquifer characteristics, Glacial aquifers, Flow system.
Identifiers: *Temperature profiles, Temperature surveying, Heat modeling.

Circulating water is known to affect the temperature of the rock through which it flows. Analysis of existing theoretical equations suggests that shallow groundwater flow will also affect the surface soil temperature. Soil temperatures therefore might be used to delineate small, shallow groundwater flow systems; both recharge and discharge zones might be distinguished. Temperature data taken in the field during summer and winter support these theoretical conclusions and agree with the groundwater flow patterns inferred from hydrologic data. In general, winter soil temperature profiles have less data scatter than profiles of summer temperatures. The greater the rate of groundwater flow, the greater the temperature difference between recharge and discharge zones. Temperature variations ranged from 0.75C in clayey glacial till to 5C in sand. The effect on soil temperature also decreases with increasing horizontal distance between the recharge and the discharge zone. The effect of horizontal flow in a shallow confined aquifer is also predictable from theoretical models and can be shown by field studies. The amount of heat redistributed depends on the thermal properties of the aquifer and on overburden and the velocity of fluid flow. (Gigg-ISWS)
W74-12300

IDENTIFICATION OF PARAMETERS IN AN INHOMOGENEOUS AQUIFER BY USE OF THE MAXIMUM PRINCIPLE OF OPTIMAL CONTROL AND QUASI-LINEARIZATION,
California Univ., Los Angeles. Dept. of Systems Engineering.
A. C. Lin, and W. W-G. Yeh.
Water Resources Research, Vol 10, No 4, p 829-838, August 1974. 3 fig, 3 tab, 13 ref, 1 append. UCAL-WRC-W-290.

Descriptors: *Aquifer characteristics, *Diffusivity, *Optimization, *Linear programming, *Least squares method, Mathematical studies, Parametric hydrology, Mathematics, Observation wells, Wells, Groundwater, Computer models, Aquifers.
Identifiers: *Inverse problem, *Maximum principle optimization, Quasi-Linerization, Parameter identification, Finite differences, Unconfined aquifer, Numerical example.

Optimal identification of aquifer parameters in a distributed system was formulated as an optimal control problem. The dynamics of the head was governed by a second-order nonlinear partial differential equation. The numerical example presented considers that the parameters to be identified were functions of the space variable. Observations on head variations were available at several observation wells distributed within the system. Spatial discretization was first used to transform the distributed system to a lumped system. The least squares criterion function was then established. After introducing the Lagrange multipliers, the maximum principle was applied to obtain the set of necessary conditions that is optimal. These conditions were expressed in terms of a set of canonic equations of two-point boundary value type that is easily solved by the technique of quasi-linearization. Thus aquifer parameters were directly identified on the basis of observational data taken at observation stations. The maximum principle formulation is inherently more accurate and stable, since it minimizes the least squares error over the whole time and space domains. Computationally, it is extremely efficient. The numerical example presented demonstrates simultaneous identification of 11 parameters defined at discretized points along the space variable. Quadratic convergence was also demonstrated by numerical experimentation. (Prickett-ISWS)
W74-12308

DATA FROM CONTROLLED DRILLING PROGRAM IN LEE AND OGLE COUNTIES, ILLINOIS,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-12317

GHANATS OF IRAN: DRAINAGE OF SLOPING AQUIFER,
Iranian Plan and Budget Organization, Tehran. Technical Bureau.
For primary bibliographic entry see Field 4B.
W74-12318

COLUMN SCANNING WITH SIMULTANEOUS USE OF 241AM AND 137CS GAMMA RADIATION,
Agricultural Univ., Wageningen (Netherlands).
For primary bibliographic entry see Field 2G.
W74-12319

PIPE FLOW MODELS OF A KENTUCKY LIMESTONE AQUIFER,
Kentucky Univ., Lexington. Dept. of Geology.
J. Thrailkill.
Groundwater, Vol 12, No 4, p 202-205, July-August 1974. 3 fig, 1 tab, 12 ref.

Descriptors: *Groundwater movement, *Computer models, *Aquifers, *Surface groundwater relationships, *Limestones, Hydrologic properties, Darcys Law, Transmissivity, Carbonate rocks, Water table, Springs, *Kentucky.
Identifiers: Sinkhole Plain(Ky), Green River(Ky), Little Barren River(Ky), Pipe network model, Groundwater modeling, Barren River(Ky).

A digital computer program which simulates a limestone aquifer as a pipe network was written and compared with the Sinkhole Plain aquifer of west-central Kentucky. Model 1, which considers the flow in the network to be laminar, yielded values of head, flow in the network, and discharge at the bounding streams which are in reasonably good agreement with field observations. The overall hydraulic conductivity of the aquifer appears to be about 5600 meinzers if the zone of active flow is 30 meters thick, but the northeastern portion of the aquifer probably has a higher transmissivity. The indicated location of the principal groundwater divide agrees well with data derived from wells and from tracing undergroundwater flows. A second model (Model 2) was constructed which considers flow in the network to be turbulent. Although this model yields values which differ from Model 1, the differences are too small to allow the mode of flow in the aquifer to be distinguished using observational data. (Sanderson-ISWS)
W74-12326

NATURAL LONG-PERIOD GROUNDWATER LEVEL FLUCTUATION,
V. S. Kovalevskiy.
Soviet Hydrology: Selected Papers, No 1, p 38-50, 1973. 10 fig, 1 tab, 18 ref. Translated from Vodnyye Resursy, No 1, p 161-177, 1973.

Descriptors: *Water level fluctuations, *Water table, *Hydrogeology, *Forecasting, Variability, Groundwater resources, Groundwater, Hydrology, Projections, Frequency.
Identifiers: *USSR.

The periodicity patterns examined led to the conclusion that there is a considerable regional irregularity in the natural groundwater recharge over a long period. This must unavoidably be reflected in river recharge and in the general hydrologic budget of the USSR. The inertia of groundwater runoff results in the redistribution of variations in groundwater recharge with time. Groundwater plays a definite regulating role in the general hydrologic cycle of the earth. Yet, the periodicity of groundwaters shows that they are an inseparable part of the hydrosphere of the earth whose regime must be analyzed by unified methods and as a whole. Observed groundwater level fluctuations for selected wells and curves of the groundwater levels forecast for individual regions of the USSR were presented. (Humphreys-ISWS)
W74-12327

METHOD FOR COMPUTING NORMAL GROUNDWATER DISCHARGE INTO SMALL RIVERS,
B. M. Dobroumov.
Soviet Hydrology: Selected Papers, No 1, p 66-70, 1973. 3 fig, 2 tab, 3 ref. Translated from GGI, Sbornik rabot po gidrologii, No 10, p 89-96, 1970.

Descriptors: *Base flow, *Surface-groundwater relationships, *Groundwater basins, *River flow, Groundwater, Subsurface waters, Regions, Discharge(Water), Groundwater resources, Drainage area, Watersheds(Basin), Hydrologic equation, Hydrology.
Identifiers: *USSR(Central Chernozem Regions), Small rivers.

Groundwater inflow to rivers was determined by separating total river runoff hydrographs into surface and subsurface components. Hydrogeological regionalization of the Central Chernozem Regions and determination of long-period mean groundwater inflow rates to rivers made it possible to construct curves of the groundwater discharge rate as a function of river basin area for each region. Maps of hydroisohypses showed that the surface and subsurface drainage basins coincide over most of the region under study. The largest drainage areas reported for which a river can be regarded as small were determined from these curves. Annual values of groundwater inflow rate to small rivers was reported equal to a times the river basin F raised to the n power, where a and n are regional parameters. Reported values for a varied from 0.000008 to 0.00085 and from 1.02 to 1.49 for n. Relationship was not recommended for river basin areas less than 100 sq km. (Humphreys-ISWS)
W74-12331

INTEGRODIFFERENTIAL EQUATIONS FOR SYSTEMS OF LEAKY AQUIFERS AND APPLICATIONS 2. ERROR ANALYSIS OF APPROXIMATE THEORIES,
Universidad Nacional Autonoma de Mexico, Mexico City. Centro de Investigacion en Matematicas Aplicadas y Sistemas.
I. Herrera.
Water Resources Research, Vol 10, No 4, p 811-820, August 1974. 2 fig, 1 tab, 17 ref, 1 append.

Descriptors: *Aquitards, Drawdown, Storage capacity, Permeability.
Identifiers: *Confined aquifer, *Vertical flow, *Leaky aquifer systems, *Error analysis.

This paper is the second of a series devoted to developing a method of analysis based on the integrodifferential equations of leaky aquifer systems. In part 1 (Herrera and Rodarte, 1973a) (W73-13378) the integrodifferential equations were derived, and an interpretation for some of the approximate theories was given in terms of the memory functions occurring in the equations. The same equations are quite suitable for a systematic analysis of the errors involved, and therefore in this paper they are used to carry it out. (Schicht-ISWS)
W74-12333

GEOHYDROLOGY OF THE PARKER-BLYTHE-CIBOLA AREA, ARIZONA AND CALIFORNIA,
Geological Survey, Washington, D.C.
D. G. Metzger, O. J. Loeltz, and B. Irelan.
Available from Sup Doc GPO, Washington, DC 20402, Price $5.00. Professional Paper 486-G, 1973. 130 p, 37 fig, 6 plate, 14 tab, 53 ref.

Descriptors: *Water resources, *Arizona, *California, *Groundwater, *Hydrogeology, Alluvium, Surface-groundwater relationships, Colorado River basin, Irrigation water, Hydrologic data, Water yield, Transmissivity.
Identifiers: Parker-Blythe-Cibola area(Calif-Ariz).

An investigation of the groundwater resources of the Parker-Blythe-Cibola area, Arizona and California, began in 1960 as a part of the Lower Colorado River Project (LCRP). The area extends from Davis Dam south along the valleys of the Colorado River to the international boundary and to Coachella and Imperial Valleys. The geologic units that are important in water resources are the Miocene fanglomerate, the Bouse Formation, and the alluvium of the Colorado River and its tributaries. The fanglomerate is a potentially important aquifer. Throughout most of the area, wells in the Bouse Formation will yield very limited quantities of water. Most of the wells in the area yield water from the Colorado River alluvium. Wells that tap a sufficient thickness of these gravels have specific capacities larger than 100 gpm per foot of drawdown. The Colorado River recharges the aquifers both directly and indirectly by infiltration of irrigation water. The pattern of water-level fluctuations is a combination of the effects of changes in river stages, irrigation, and consumptive use. Rarely does the resultant effect exceed 3 feet. Transmissivities range from less than 100 to a high of 700,000 gallons per day per foot. Except where the water has been freshened as a result of irrigation, much of the shallow groundwater is of relatively poor quality. Water in the river and in the alluvium generally contains between 650 and 800 milligrams per liter dissolved solids; sulfate is the predominant constituent. (Knapp-USGS)
W74-12339

INDUCED INFILTRATION AT THE UNIVERSITY OF CONNECTICUT WELL FIELD,
Connecticut Univ., Storrs.
For primary bibliographic entry see Field 4B.
W74-12529

TIDAL FLUCTUATIONS OF WATER LEVELS IN WELLS IN CRYSTALLINE ROCKS IN NORTH GEORGIA,
J. W. Stewart.
Geological Survey Research, Article 46, 1961. p B-107-B-109, 1 fig, 1 ref.

Descriptors: *Groundwater, Water wells, *Crystalline rocks, Tides, Diurnal, Metamorphic rocks, Saprolites, Beds(Stratigraphic), Folds(Geologic), Permeability, Weathering, Clays, Silts, Cracks, Confined water schists, Hydrology, *Georgia, *Tidal effects, *Water level fluctuations.
Identifiers: Lunar cycle.

The semidiurnal water-level fluctuations of a tidal period were observed in wells in metamorphic crystalline rocks during a geologic and hydrologic study at the Georgia Nuclear Laboratory in Dawson County, Ga. The following evidence indicates that the semidiurnal fluctuations of water levels are the result of earth tides produced by the attraction of the moon and sun: (1) two daily cycles of water-level fluctuations occur in the wells, about 50 minutes later each day; (2) the close agreement of the average daily retardation of the peaks and troughs in the wells with that of the average daily retardation of the moon's transit; (3) the occurrence of regular fluctuations of maximum amplitudes during periods of new and full moon and irregular fluctuations of minimum amplitudes during periods of the first and last quarters of the moon; and (4) the coincidence of the lowest water levels in wells with that of the moon's transit at upper and lower culmination. (Campbell-NWWA)
W74-12551

DISPOSAL OF URANIUM-MILL EFFLUENT NEAR GRANTS, NEW MEXICO,
For primary bibliographic entry see Field 5E.
W74-12552

HYDROLOGICAL REGIME OF LOWER DNIEPER SANDS IN CONNECTION WITH THEIR AFFORESTATION, (IN RUSSIAN),
V. N. Vinogradov.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 2, p 37-40, 1973. Illus.
Identifiers: Fluctuations, *Reforestation, Percolation, Sands, *USSR(Dnieper River).

Massive pine plantings affect the hydrological regime just as herbaceous vegetation of overgrown areas. Afforestation of the latter does not introduce marked changes into the total regime of groundwaters. The groundwaters of the near-water sands of the region belong to the desorptive-corrective type which undergo spring-summer-fall desorptive lowering and fall-winter-spring percolation corrective rise. A special feature is the presence of a winter corrective rise due to mild winters and prolonged thaws.--Copyright 1973, Biological Abstracts, Inc.
W74-12555

MAP SHOWING DEPTH TO BEDROCK, HARTFORD SOUTH QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12627

CONTOUR MAP OF THE BEDROCK SURFACE, TARIFFVILLE QUADRANGLE, CONNECTICUT-MASSACHUSETTS,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12628

MAP SHOWING DEPTH TO BEDROCK, OLD LYME QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12629

CONTOUR MAP OF THE BEDROCK SURFACE, GLASTONBURY QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12630

CONTOUR MAP OF THE BEDROCK SURFACE, ELLINGTON QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12631

MAP SHOWING AVAILABILITY OF GROUNDWATER, WARREN QUADRANGLE, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 7C.
W74-12632

A GROUNDWATER INVESTIGATION OF THE LUMMI INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4B.
W74-12635

APPRAISAL OF OPERATING EFFICIENCY OF RECHARGE BASINS ON LONG ISLAND, NEW YORK, IN 1969,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-12655

2G. Water In Soils

HIGH-RATE LAND TREATMENT I: INFILTRATION AND HYDRAULIC ASPECTS OF THE FLUSHING MEADOWS PROJECT,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W74-12004

ZONAL CENTRIFUGATION: APPLIED ASPECTS IN ELUCIDATING CHEMICAL AND BIOLOGICAL FORMS, DISTRIBUTION AND AVAILABILITY OF HEAVY METALS IN THE ENVIRONMENT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-12026

THE ANSWER OF THE SOIL GENETIC CRITERIA TO THE QUESTION OF THE FUNCTION AND DURABILITY OF AMELIORATING SUB-SOILING OF PSEUDOGLEY,
Institut National de la Recherche Agronomique, Tunis (Tunisia).
E. Kopp.
Z Kukturtech Flurbereinig. Vol 13, No 5, p 272-278, 1972. (English summary).
Identifiers: *Pseudogley, *Soil surveys, *Subsoiling, *Tillage.

Comparative soil surveys, cartography, physical measurements of different old drainage ditches and archeological layouts showed that under certain conditions, a constant mellowing can be reached. Condensations are soil-physically favorable structures, a product of certain age and of specific soil dynamic processes. Subsoiling or deep tillage are actions which artificially influence the buffer system of the soil. Effects of unchangeable but fossil processes are neutralized and adapted to actual conditions of soil structure. Adequate deep tillage and accessory actions will transform soils which are not adapted to modern environmental conditions, and for centuries, these soils will regain unfavorable physical condition.--Copyright 1973, Biological Abstracts, Inc.
W74-12157

PRIMARY CHECKING OF DATA ON MOISTURE RESERVES IN SOIL WITH ELECTRONIC COMPUTERS, (IN RUSSIAN),
V. A. Zhukov.
Tr Inst Eksp Meteorol Gl Upr Gidrometeorol Sluzhby Pri Sov Minist SSSR. 13, p 57-65, 1970.

Identifiers: Computers, *Soil moisture, *USSR(Belorussia), Crops, Soil horizons, *Data collections.

The paired coefficients of correlation (r) between moisture reserves under winter crops in different soil horizons were calculated on the basis of a large volume of information on the reserves of available moisture in different soils of the Belorussian SSR. The correlation between the moisture reserves in the individual 10 cm horizons is clearly traced in the upper 60-cm layer. The moisture reserves in the 50-60-cm layer are well correlated with the moisture in the 90-100 cm layer (r=0.69). The correlation between the moisture reserves in the 10-cm soil layers was used to construct statistical schemes of the primary check in the form of the control W(j-1)-j=EWj(j-2)-(j-1)+Cj, where W (j-1)-j is the estimate of moisture reserves in the soil layers 10-20, 20-30,....,90-100 cm- W(j-2)-(j-1), represents the actual moisture reserves of the soil in the layers 0-10, 10-20,..., 80-90 cm; Ej, coefficient of regression; Cj, free term of the equation. It is possible to use computers for checking if errors exceeding certain permissible limits have been detected.--Copyright 1973, Biological Abstracts, Inc.
W74-12159

CONTRIBUTIONS TO THE KNOWLEDGE OF TISSA PLAIN PSEUDOGLEY SOILS, (IN RUMANIAN),
Institutul de Studii si Cercetari Pedologie, Bucharest (Rumania).
I. Munteanu, G. Babos, P. Vasilescu, A. Conescu, and M. Munteanu.
Annales Inst Stud Cercet Pedol. 39, p 259-279. 1971. Illus. English summary.
Identifiers: Albaqualf, Pedogenesis, Plains, Planosol, *Pseudogley soil, *Romania(Tissa plain), Soils, *Soil types, *Soil classification.

Pseudogley soils of the Tissa plain (Romania) develop in the oak forest zone in areas having a flat or slightly inclined position (terraces or piedmont, slightly dissected plains), covered with fine deposits with over 45% of the fractions less than 0.002 mm. Average annual temperature ranges between 10.3 deg - 10.9 deg, while the average annual rainfall ranges between 600-760 mm, important seasonal, contrasting moisture values are frequently noted. In connection with fine texture of parental material (and probably with the climate), the argilluviation process is accompanied by the appearance of features characteristic to plansols, i.e.: an upper, strongly bleached and clay-impoverished horizon, an abrupt change of texture and a Bt horizon strongly enriched in fine fractions. Two groups of pseudogley soils may be noted as a function of argilluviation intensity: slightly and moderately 'lessive' pseudogley and 'lessive' pseudogley soils. Soils possessing a texture differentiation index of 1.7-1.9, a moderate debasification (V = 53-74%) and a moderately-weak acid reaction (pH = 5.4-6.1) are included in the first group. The second group includes soils with texture differentiation indexes exceeding 2.5(2.5-3.2), dominantly oligomesobasic (V = 45-56% or even 30%) and possessing a moderately - strong acid reaction (pH = 5.0-5.7). Variation of free iron/total iron and free iron/clay (less than 0.002 mm) ratios in the soil profile evidences a relative accumulation of the free-iron in the upper horizon -- a specific feature of these soils. Chemical analysis of clay fraction less than 0.01 mm shows an increase in the ratio SiO2/R2O3 from 2.7 in the elluvial horizon, to 3.04 in the illuvial one. The Tissa plain pseudogley soils may be regarded as hydromorphic clay -- illuvial soils (Stagnohydromorphic). The main part of pseudogley soils are classified, according to FAO classification, as planosols (entric and dystric-entric), while in the American classification, these soils are found under Albaqualf soils (mostly typical and some vertic).--Copyright 1974, Biological Abstracts, Inc.
W74-12282

WATERPROOFING SURFACE-ZONE SOIL AGGREGATES FOR WATER CONSERVATION,
Hebrew Univ., Rehovot (Israel). Faculty of Agriculture.
D. Hillel, and P. Berliner.
Soil Science, Vol 118, No 2, p 131-135, August 1974. 3 fig, 12 ref.

Descriptors: *Soil sealants, *Laboratory tests, *Water conservation, *Soil profiles, *Waterproofing, Coatings, Soil analysis, Hydraulic models, Evaporation control, Water resources, Soil tests, Soil management, Infiltration, Soil moisture, Soil treatment, Retention, Soil profiles, Percolation.
Identifiers: *Israel(Malkia-Upper Galilee), Terra-rossa clay loam.

Layers of silicone-treated soil aggregates of various depths and size classes were tested in laboratory columns to determine their effect upon the processes of water intake and evaporation. The results showed that the presence of a top layer of hydrophobic aggregates can either decrease or increase infiltrability, depending on the sizes of the aggregates, which determine the effective diameters of the interaggregate voids. If the aggregates are sufficiently large, a top layer of hydrophobic aggregates can readily transmit water downwards even while the aggregates themselves remain dry. A secondary consequence of this effect is the prevention of slaking or crust formation, which often inhibits infiltration. The presence of a top-layer of hydrophobic aggregates had a marked effect in reducing evaporation, the magnitude of this reduction again depending on the sizes of the aggregates and the depth of the aggregated layer. Aggregate-size classes were 0.2-0.5 mm, 0.5-1 mm, 1-2 mm, 2-5 mm. Waterproofing surface-zone soil aggregates appeared to be a promosing approach to soil water conservation, and must be tested in the field. (Humphreys-ISWS)
W74-12289

THE ROLE OF OXYGEN IN NITROGEN LOSS FROM FLOODED SOILS,
Louisiana State Univ., Baton Rouge.
W. H. Patrick, Jr., and S. Gotoh.
Soil Science, Vol 118, No 2, p 78-81, August 1974. 3 fig, 1 tab, 5 ref. EPA Project R-800428.

Descriptors: *Soil science, *Laboratory tests, Oxygen requirements, *Nitrification, Soil analysis, Aerobic conditions, Oxygen, Nitrogen, Oxidation, Denitrification, Nitrates, Nitrogen cycle, Soil surfaces, Soil chemistry.
Identifiers: *Flooded soils, Crowley silt loam soil.

The concentration of atmospheric 02 over a flooded soil was a factor in determining the amount of N lost by denitrification. Large increases in N loss occurred from the first few increments of oxygen with little further loss occurring above 20 percent 02. The thickness of the aerobic layer was also governed by the amount of 02 in the air. Nitrogen loss was generally related to the thickness of the aerobic layer, even though appreciable loss occurred at 5 and 10 percent 02 where the aerobic layer was relatively thin. (Humphreys-ISWS)
W74-12290

SEEPAGE RATES AND THE HORIZONTAL FLOW APPROXIMATION,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
For primary bibliographic entry see Field 8D.
W74-12297

DETERMINATION OF DISPERSION AND NONLINEAR ADSORPTION PARAMETERS FOR FLOW IN POROUS MEDIA,
Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
S. P. Gupta, and R. A. Greenkorn.
Water Resources Research, Vol 10, No 4, p 839-846, August 1974. 10 fig, 3 tab, 19 ref.

Descriptors: *Dispersion, *Adsorption, *Porous media, Groundwater movement, Permeability, Isotherms, Nitrates, Phosphates.
Identifiers: *Linear equilibrium adsorption, Freundlich equilibrium adsorption, Linear superposition, Breakthrough curves, Reynolds number.

Ottawa washed sand mixed with 0.0-7.5% kaolin clay was used to determine dispersion and nonlinear adsorption parameters during flow through porous media. The ions considered were nitrate for the nonadsorbing species and phosphate for the adsorbing species. A one-dimensional linear model with a longitudinal dispersion coefficient was used, and the dispersion coefficient was determined by least squares fit. The dispersion coefficients were correlated with dispersivity models based on kinematic viscosity and powers of velocity and Reynolds number. The velocity exponent seemed independent of clay content, whereas the model coefficients increased approximately linearly with clay content. The static adsorption data suggest a Freundlich isotherm. The principle of linear superposition was assumed for dipersion and adsorption to estimate the dynamic parameters. The adsorption parameter for the linear model was approximately linear with clay content. The two adsorption parameters for the nonlinear model were highly correlated and cannot be estimated simultaneously from dynamic measurements alone. The linear model described the movement of phosphate ions adequately for the medium considered. However, for a natural system in which clay content is high and phosphate ion concentration is low one would expect better data from the generalized nonlinear model. (Visocky-ISWS)
W74-12299

THE HYDROMETER METHOD FOR DETAILED PARTICLE-SIZE ANALYSIS: 1. GRAPHICAL INTERPRETATION OF HYDROMETER READINGS AND TEST OF METHOD,
Agriculture Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
For primary bibliographic entry see Field 2J.
W74-12303

EXPERIMENTAL EVALUATION OF CHEMICAL TRANSPORT IN WATER-SATURATED POROUS MEDIA: 1. NONSORBING MEDIA,
Oregon State Univ., Corvallis. Dept. of Soil Science.; and Oregon State Univ., Corvallis. Dept. of Agricultural Chemistry.
S. K. Saxena, F. T. Lindstrom, and L. Boersma.
Soil Science, Vol 118, No 2, p 120-126, August 1974. 3 fig, 2 tab, 10 ref. NIEHS Grant ES 00040, USDI Grant B-001-ORE.

Descriptors: *Dispersion, *Diffusion, *Sorption, Porous media, Voids.
Identifiers: *2,4-dichlorophenoxyacetic acid, *Chemical transport, Pore radii, Glass beads, Breakthrough curve.

Dispersion profiles of 2,4-dichlorophenoxyacetic acid were measured experimentally to evaluate a theoretical dispersion model previously developed by the investigators and to evaluate the effect of pore size on dispersion. The chemical being dispersed along a column made up of glass beads was initially present only in the pore water of a 1 cm long section at the front of the column. After leaching for a period of time, the column was sectioned and the concentration in each section was obtained and compared with a predicted concentration. Four porous media systems consisting of glass beads with particle diameters of less than 30, 28-53, 105-149, and 149-210 millimicrons obtained by dry sieving were used. Corresponding predominant pore radii were 4.5, 8.2, 19.5, and 36.2 millimicrons. The corresponding dispersion coeffi-

cients were found to be 0.53, 0.69, 1.41, and 2.05 sq cm/day, respectively. Using these values, theoretical dispersion profiles were calculated. The theoretical distributions of the chemical in the columns were found to be in good agreement with the experimentally determined distributions. The values of the dispersion coefficients could be related to pore size, diffusion coefficient, and flow rate. (Visocky-ISWS)
W74-12306

LATERAL MOVEMENT AT THE PERIPHERY OF A ONE-DIMENSIONAL FLOW OF WATER,
Connecticut Agricultural Experiment Station, New Haven. Dept. of Ecology and Climatology.
N. C. Turner, and J. Y. Parlange.
Soil Science, Vol 118, No 2, p 70-77, August 1974. 5 fig, 11 ref.

Descriptors: *Soil water movement, *Soil physical properties, *Infiltration, Recharge, Diffusivity, Moisture content.
Identifiers: Double ring infiltrometer.

An approximate analytical solution for the lateral movement at the periphery of a one-dimensional flow of water without gravity was derived for a source that is a semi-infinite plane. The solution was shown to be valid experimentally for relatively long times for a source with finite length. The theory can be utilized to calculate, and correct for, the additional infiltration due to lateral movement in measurements of water intake in the field; when gravity was present, however, the correction was valid only for short times. (Schicht-ISWS)
W74-12309

PERSISTENCE AND MOVEMENT OF DBCP IN THREE TYPES OF SOIL,
California Univ., Davis. Dept. of Nematology.
For primary bibliographic entry see Field 5B.
W74-12310

TWO-DIMENSIONAL SEEPAGE IN LAYERED SOIL--DESTABILIZING EFFECTS OF FLOWS WITH AN UNSTEADY FREE SURFACE,
State Univ. of New York, Stony Brook.
D. Dicker, and D. K. Babu.
Water Resources Research, Vol 10, No 4, p 801-809, August 1974. 5 fig, 8 ref, 1 append.

Descriptors: *Soil stability, *Seepage, *Unsteady flow, *Free surface, *Landslides, Groundwater, Soil pressure, Soil water, Soil water movement, Soil moisture, Soil investigations, Soil mechanics, Soil properties, Mathematical studies, Mathematics, Mathematical models.
Identifiers: *Layered soils, *Perturbation techniques, Soil slope, Prolonged rainfall effects, Heterogeneous porous media.

An analytic study was made about the destabilizing effects of a prolonged rainfall over the sides of a long symmetric hill. The assumptions underlying the analysis were (1) the soil consisted of layers parallel to the hillslope, (2) the flow domain was bounded from below by an unknown free surface, and (3) this free boundary moves downward with passage of time. The resulting flow pattern was therefore time dependent. The motion is described by Darcy's law as applied to a saturated porous medium having variable conductivity. Perturbation techniques were applied in constructing the solution to this nonlinear problem. For certain portions of the flow region the perturbation becomes singular, and the singularities were removed by the methods of matched asymptotic expansions. Properties of singular integrals with Cauchy kernels were employed in certain quantitative estimates. Only the first-order effects are presented here. It was shown that one large-time effect of prolonged rainfall is to generate outward horizontal velocity components in the distant regions of the slope; these components grow in time. It is known in soil mechanics that such tendencies to outward flow have serious destabilizing effects on the soil slope. This paper demonstrates that the underlying causes for such disasters as landslides can be traced in a significant fashion to the hydrodynamic nature of the seepage that evolves naturally as a result of prolonged rainfall. (Pickett-ISWS)
W74-12315

COLUMN SCANNING WITH SIMULTANEOUS USE OF 241AM AND 137CS GAMMA RADIATION,
Agricultural Univ., Wageningen (Netherlands).
L. Stroosnijder, and J. G. De Swart.
Soil Science, Vol 118, No 2, p 61-69, August 1974. 4 fig, 1 tab, 13 ref.

Descriptors: *Soil moisture, *Moisture availability, *Groundwater availability, *Radioisotopes, *Analytical techniques, Soil analysis, Instrumentation, Soil tests, Soil water, Moisture content, Hydrologic properties, Radiation, Gamma rays, Radiochemical analysis, Radioactivity techniques, Analysis.
Identifiers: *Gamma radiation, *Column scanning, 241 Am, 137 Cs, *Automatic scanner, Statistical accuracy, Counting rates, Attenuation coefficients.

A soil column scanner using two sources of gamma radiation (241 Am and 137 Cs) simultaneously was described. Separate amplifer/discriminator systems were used for each source. In order to minimize the 137 Cs influence on the 241 Am detector, a cross-beam layout was chosen. A correction of about 10 counts/second on the 241 Am count rate eliminated any remaining 137 Cs influence. Punch tape output permitted fast data assimilation. Variation in mass attenuation coefficients for soil seriously limited the use of this technique in natural soil columns. Statistical accuracy was poor compared to a single moisture determination. A counting time of at least one minute was preferable. An experiment with a swelling clay soil demonstrated the possibility of simultaneous use of both radioisotopes. The results of calibration studies were shown. (Henley-ISWS)
W74-12319

ESTIMATION OF RAINFALL EROSION INDEX,
Engineering-Science, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 2J.
W74-12321

EXPLANATION OF THE DAILY PATTERN OF WATER EVAPORATION FROM THE SOIL,
For primary bibliographic entry see Field 2D.
W74-12330

THE QUANTITY AND MOVEMENT OF NITRATES IN SOIL WATER IN TWO CONNECTICUT SOILS TREATED WITH HIGH AND LOW LEVELS OF INORGANIC NITROGEN FERTILIZER,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5B.
W74-12595

RELATION OF CLIMATE TO LEACHING OF SOLUTES AND POLLUTANTS THROUGH SOILS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W74-12645

ARGILLIZATION BY DESCENDING ACID AT STEAMBOAT SPRINGS, NEVADA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2K.
W74-12651

CLAY WATER INTERACTIONS--AN EXPERIMENTAL STUDY OF INTERFACE PHENOMENA,
Royal Inst. of Tech., Stockholm (Sweden). Nuclear Magnetic Resonance Group.
E. Forslind, and A. Jacobsson
Available from NTIS, Springfield, Va. 22161 as AD-772 042, Price $3.75 printed copy, $2.25 microfiche. Royal Institute of Technology Nuclear Magnetic Resonance Group Final Technical Report to US Army European Research Office, London, July 1973. 85 p, 32 fig, 7 tab, 71 ref. USA Contract No DAJA 37-72-C-3894.

Descriptors: *Clay minerals, *Adsorption, *Ion exchange, Kaolinite, *Montmorillonite, Nuclear magnetic resonance, Differential thermal analysis.
Identifiers: *Clay-water interactions, Vermiculite, *Hectorite.

A study of clay-water interactions by NMR and dielectric experiments compared montmorillonite and hectorite. In particular, the temperature dependence of the NMR and dielectric absorption bandwidths pointed to different proton relaxation mechanisms in the two types of clay. In fact, the nature of the discrepancies between the expected and observed system behavior called for a reconsideration, not only of the available data regarding the clay surface properties, but also of the conceptual framework currently used to explain the swelling and cation exchange mechanisms. Reconsideration of the surface structure problem is based on reevaluation of Fourier syntheses, on water structuring as revealed by recent Raman, NMR and dielectric investigations and a reevaluation of data pertaining to swelling and b-axis changes of montmorillonites. New aspects on the adsorbed water density are discussed together with questions regarding ion water interactions in kaolinite, montmorillonite, vermiculite and hectorite. (Knapp-USGS)
W74-12654

A STUDY OF BACTERIAL MIGRATION IN IRRIGATED SOILS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 5B.
W74-12704

EFFECT OF SOIL WATER POTENTIAL ON GROWTH AND YIELD OF SUNFLOWER (HELIANTHUS ANNUUS),
Pahlavi Univ., Shiraz (Iran). Dept. of Irrigation.
For primary bibliographic entry see Field 3F.
W74-12705

RECLAMATION AND MAINTENANCE OF FERTILITY OF MAJOR SOILS IN THAILAND,
A. Komes.
Thai J Agric Sci. Vol 6, No 2, p 127-143. 1973.
Identifiers: *Soil fertility, *Land reclamation, *Saline soils, *Thailand, Land use.

Soils of Thailand are of 3 groups according to physiography: soils of the alluvial plains and the lower terraces, soils of the higher terraces and the low plateaus, soils of the hills and the mountains. The reclamation is done mostly for soils of the 1st group: beach and dune sand, saline soils, acid sulfate soils, low-lying floodplains derived from sandstones, and tin-mine spoils. The soils of 2nd group are well drained, but their low organic matter content seems to cause soils to erode easily and to exert other unfavorable properties in relation to plant growth. Soil conservation practices were demonstrated at various land development centers throughout the country. The soils of the 3rd group are easily subject to severe erosion. A general review of land use and problems associated with it is given for each soil described.--Copyright 1974, Biological Abstracts, Inc.
W74-12714

SOIL MICROORGANISM METABOLISM IN SPRAY IRRIGATION,
North Texas State Univ., Denton.
For primary bibliographic entry see Field 5D.
W74-12725

STUDIES ON THE RELATIONSHIP BETWEEN MISCANTHUS SINENSIS COMMUNITY AND SOIL: IV. RELATIONSHIP BETWEEN HUMUS AND PRODUCTIVITY OF MISCANTHUS SINENSIS GRASSLAND,
Kobe Univ. (Japan). Faculty of Agriculture.
R. Kayama, N. Yano, and M. Fujimoto.
Jap J Ecol. Vol 22, No 5, p 195-204. 1972. Illus.
Identifiers: Grassland, *Humus, Magnesium, *Miscanthus-Sinensis, Nitrogen, Potassium, Respiration, Soil moisture.

The relationship among the standing crop of plants, the components of humus, seasonal change of soil moisture, amount of inorganic N and soil respiration are discussed. The amount of the minerals such as K and Mg in the fulvic acid of the humus in plots having a high standing crop was more than that of plots having a lower standing crop. The presence of a considerable amount of Al in fulvic acid was shown in the low yield plots. The seasonal variation of the soil moisture in the high yield plot was small. Generally, the soil moisture of the upper layer (0-30 cm) was constantly kept at a high level. On the contrary, the soil moisture of the upper layer decreased from July to Oct. in the low yield plots. The plot having a deep humus soil layer and favorable soil moisture content had NH4-N and HO3-N a little more than those of the other plots. These were conditioned to contain water in 60% of the maximum water holding capacity and placed in a thermostat of 30C for 3 wk. Thereafter, quantitative analysis was made on the amount of NH4-N and NO3-N. This amount may be considered as potential available N. The amount of NO3-N was scarce but that of NH4-N was usually high. There seemed to be a considerable amount of available N in the soil for the vigorous reproduction of microorganisms. (See also W72-00721)--Copyright 1973, Biological Abstracts, Inc.
W74-12737

EFFECTS OF COARSE CONSTITUENTS ON DYNAMICS OF WATER IN A SANDY SOIL: II. DYNAMICS OF WATER IN A FINE-EARTH/COARSE CONSTITUENTS SYSTEM: POSITIVE MOISTURE CHANGES, (IN FRENCH),
Institut National de la Recherche Agronomique, Versailles (France). Station Centrale d'Agronomie.
R. Gras.
Ann Agron (Paris). Vol 23, No 3, p 247-316. 1972. Illus. (English summary).
Identifiers: *Sandy soils, *Soil moisture, *Permeability.

A pebble-containing soil is a heterogeneous system consisting of two materials, fine earth and pebbles (coarse constituents). The dynamics of water in such a system was investigated experimentally using tubes filled with sandy soil containing coarse constituents of definite geometrical shape. The effects of these tubes on the kinetics of the moist front creeping forward in an initially dry soil under different water supply conditions, i.e., horizontal influx, vertical or horizontal moistening are investigated. Experimental data were evaluated in the simpler instances on the basis of the laws of hydrodynamics. After wetting the system, the effect of the coarse constituents on the conveyance of the water by the system is discussed. All constituents curtail the aggregate permeability of the system. During previous experiments the coarse porous constituents may be moistened by the sand. The variational moisture recorded arises from the nature of the coarse constituents and from the water sucked in by the sandy soil and coarse constituents.--Copyright 1973, Biological Abstracts, Inc.
W74-12742

2H. Lakes

THE INTERDEPENDENCE OF LAKE ICE AND CLIMATE IN CENTRAL NORTH AMERICA,
Wolf Research and Development Corp., Riverdale, Md.
For primary bibliographic entry see Field 2C.
W74-12074

LAKE SUPERIOR INVESTIGATIONS,
Minnesota Dept. of Conservation, St. Paul. Div. of Game and Fish.
For primary bibliographic entry see Field 8I.
W74-12079

FLOW CHARACTERISTICS OF THE OUTLET CHANNELS OF LAKE WINNIPEG FOR NATURAL AND REGULATED CONDITIONS,
Manitoba Hydro.
For primary bibliographic entry see Field 8B.
W74-12091

COMPUTER INVESTIGATIONS OF WATER MOVEMENTS IN LAKES.
A. H. Taylor.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 209-227, 25-27 September 1973. 6 fig, 3 equ, 23 ref.

Descriptors: *Water circulation, *Lakes, Computers, *Computer models, *Simulation analysis, *Mixing, *Turbulence, Variability, Temperature, Currents(Water), Velocity, Flow, Equations, Systems analysis.

Turbulent mixing plays a fundamental role in lake ecology. Considered is the use of computers to predict the circulation and mixing in lakes. The circulation, which gives rise to turbulent water movement, may not be clearly defined and may change rapidly with atmospheric conditions. Numerical simulations can elucidate lake currents besides providing forecasts for management purposes. Previous models for calculating fluid flows are discussed. Three-dimensional calculations are becoming possible and provide detailed velocity and temperature fields; presented is one such model having variable turbulence coefficients, suited to the variability of lake circulations. The model is designed to investigate lake water movement on an hourly, or a daily, basis to provide insight into the mechanisms of lake mixing. Equations of the lake model are given, and numerical experiments with homogeneous bodies of water are discussed. (See also W74-12107) (Bell-Cornell)
W74-12118

WIND DRIVEN CIRCULATION IN SHALLOW LAKES: A FINITE ELEMENT APPROACH,
Water Research Association, Marlow (England).
J. M. Davis.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 63-70, 25-27 September 1973. 3 fig, 19 equ, 3 ref.

Descriptors: *Finite element analysis, *Lakes, *Shallow water, *Circulation, *Winds, Velocity, Lake Erie, Lake beds, Currents(Water), Analytical techniques, Systems analysis.
Identifiers: Wind accelerations, Differential equations.

The finite element method is applied to the problem of wind-driven circulation in shallow lakes. The system is considered to be two dimensional so that vertical accelerations and velocities are ignored under the assumption that they are small compared with horizontal velocities. A hydrostatic pressure distribution is assumed to exist. The model describes the unsteady circulation pattern due to wind stresses at the free surface and includes both bed friction and Coriolis effects. The Galerkin method of weighted residuals is used to formulate a set of matrix equations which are solved using an implicit time integration scheme. The components of wind force represent the forcing functions of the system, and the effect of bed friction and the Earth's rotation are included through the Chezy friction term and the Coriolis parameter respectively. The methodology is illustrated with an application to Lake Erie. (See also W74-12107) (Bell-Cornell)
W74-12138

THE DISTRIBUTION OF THE SUBMERGED MACROPHYTES IN THE REEDLESS ZONE OF THE NEUSIEDLER LAKE, (IN GERMAN),
Vienna Univ. (Austria). Limnologische Lehrkanzel.
F. Schiemer, and P. Weisser.
Sitzungsber Osterr Akad Wiss Mathnaturwiss Kl. Vol 180, No 1-4, p 87-97, Illus, 1972.
Identifiers: Ceratophyllum-demersum, Characeratophylla, *Distribution patterns, Lakes, *Macrophytes, Myriophyllum-spicatum, Najas-marina, Potamogeton-pectinatus, Reedless zones, Reeds, Soils, Wind, Submerged plants, *Austria(Neusiedler Lake).

Potamogeton pectinatus and Myriophyllum spicatum form a broad band of plants in front of reeds. Their distributional pattern is dependent on wind and soil conditions. Soft silt deposits in combination with low turbulence are favorable conditions. The diminished growth along the eastern shore and toward the open sea are proof that waves and a solid or coarsely structured substrate have a negative effect on their growth. P. pectinatus is found in variable densities and crop configurations all over the sea surface and is more abundant within the reed belt than M. spicatum, but takes up a lesser areal portion than the latter. The density of P. pectinatus has decreased due to the increase in depth from 102 cm in 1958 to 165 cm in 1970. Ceratophyllum demersum, Chara ceratophylla and Najas marina are other submerged plants found in the area.--Copyright 1974, Biological Abstracts, Inc.
W74-12150

ECOLOGY OF THE EULITTORAL ZONE OF LAKES,
Warsaw Univ. (Poland). Zoological Inst.
For primary bibliographic entry see Field 5C.
W74-12151

SPATIAL AND TIME CHANGES OF SOME ENVIRONMENTAL FACTORS IN THE PELAGIAL OF MIKOLAJSKIE LAKE,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
J. I. Rybak.
Ekol Pol. Vol 20, No 40, p 541-560, Illus, 1972.
Identifiers: Calcium, Conductivity, Environmental studies, Iron, *Lakes, Magnesium, Nitrogen, Oxygen, *Pelagial, Phosphate, *Poland(Mikolajskie Lake), Potassium, Sodium, Spatial, Temperature, Time.

The changes in time and differentiation within the pelagial of Mikolajskie Lake (Masurian Lakeland, Poland) of some environmental factors were measured. The following were analysed: visibility, temperature, oxygen, pH, Fe, Mg, Ca, phosphate, K, Na, N and conductivity.--Copyright 1974, Biological Abstracts, Inc.
W74-12155

SEASONAL AND ANNUAL PHYTOPLANKTON CHANGES IN CHIVYRKUISKII BAY, LAKE BAIKAL, (IN RUSSIAN),
Limnologicheskii Institut, Irkutsk (USSR).
For primary bibliographic entry see Field 5C.

W74-12160

HYDROLOGICAL AND PHYSICOCHEMICAL CHARACTERISTICS OF THE FISH PONDS OF SOUTHERN TADZHIK SSR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
N. I. Bogdanov, and G. I. Bogdanova.
Izv Akad Nauk Tadzh SSR Otd Biol Nauk. 2. p 69-72, Illus, 1973.
Identifiers: Canals, *Carp, Fertilizer, *Fish ponds, Grass carp, Hydrochemical studies, Percolation, Physicochemical studies, Temperature, *USSR(Southern Todzhik SSR).

An investigation of the ponds of the 'Chubek' fishery, located along the former bed of the Afgan-Darya River in southern Tadzhikistan, USSR, showed that the natural and climatic conditions of the location of the ponds are favorable for raising pond fish (carp and grass carp). The temperature regime of the fish ponds is characterized by early warming of the water and comparatively late cooling. The hydrochemical regime of the ponds is favorable. The application of fertilizer to the pond did not have a noticeable adverse effect on the gas regime of the water. Water exchange in the ponds occurs rather intensely owing to percolation of water through the bed and embankments of the ponds. The ponds, which are supplied by a system of canals, accumulate a large quantity of suspended mineral substances, which leads to a reduction of their useful volume and area.--Copyright 1974, Biological Abstracts, Inc.
W74-12166

MICROBIOLOGICAL OXIDATION OF HYDROGEN SULFIDE IN THE REPNOE LAKE (SLAVONIC LAKES), (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
For primary bibliographic entry see Field 5C.
W74-12168

FIRST ANNUAL REPORTS OF THE EPA IFYGL PROJECTS.
National Environmental Research Center, Grosse Ile, Mich. Grosse Ile Lab.
For primary bibliographic entry see Field 5C.
W74-12214

PHYTOPLANKTON NUTRITION AND PHOTOSYNTHESIS IN LAKE MINNETONKA AND LAKES AT FAIRMONT, MINNESOTA,
Minnesota Univ., Minneapolis. Dept. of Ecology and Behavioral Biology.
For primary bibliographic entry see Field 5C.
W74-12227

DISTRIBUTION OF CYCLOPOIDA COPEPODITES IN THE RESTING STAGE IN BOTTOM SEDIMENTS OF ASTATIC RESERVOIRS,
Polish Academy of Sciences, Warsaw. Inst. of Experimental Biology.
M. Wierzbicka.
Pol Arch Hydrobiol. Vol 19, No 4, p 369-376, 1972, Illus.
Identifiers: Acanthocyclops-Bicuspidatus, Acenthocyclops-Gigas, *Astatic reservoirs, *Bottom sediments, Chemical studies, Climatic studies, *Copepodites, *Cyclopida, Cyclops-Furcifer, Cyclops-Strenuus, *Distribution(Vertical-horizontal), *Poland(Warsaw region), Reservoirs, Sediments.

Horizontal and vertical distributions of copepodites IV and V in the resting stages of 4 Cyclopoida species (Cyclops strenuus, C. furcifer, Acanthocyclops gigas and A. bicuspidatus) were investigated in bottom sediments of 2 astatic reservoirs deprived of water from the end of June until March. The reservoirs are situated close to each other among cultivated fields near the Kampinos Forests, about 30 km from Warsaw, Poland. There were significant differences in quantitative species composition between the reservoirs. Moreover, there were significant differences in horizontal distribution of copepodites in the smaller reservoir between July and Aug. There were also differences in vertical distribution: in the smaller reservoir there were more copepodites in the top layer of sediment (0-1 cm) than in the larger one and they only penetrated to 2.5 cm. The following similarities were found: maximal numbers of copepodites were in the 1-2 cm layer in both reservoirs in Aug. and Oct.; at that time specimens did not penetrate deeper than 5 cm; the species common to both reservoirs preferred similar depths. The differences were probably due to: different substrates, the chemistry of the reservoirs, the span of time from the beginning of the resting stage (influencing the vertical distribution) and climatic conditions (influencing the horizontal distribution).--Copyright 1974, Biological Abstracts, Inc.
W74-12236

CHANGES IN THE FISH SPECIES COMPOSITION OF THE GREAT LAKES,
Ontario Ministry of Natural Resources, Maple. Fish and Wildlife Research Branch.
For primary bibliographic entry see Field 5C.
W74-12264

THE EMISSION OF BIOGENIC HYDROGEN SULFIDE FROM AMAZONIAN FLOODPLAIN LAKES,
Instituto Nacional de Pesquisas da Amazonia, Manaus (Brazil).
For primary bibliographic entry see Field 5B.
W74-12284

UTILIZATION OF FACTORIAL ANALYSIS IN CONNECTION WITH THE STUDY OF GROWTH IN BENTHIC MOLLUSKS OF LAKE CHAD, (IN FRENCH),
C. Leveque, and M. Gaborit.
Cah O R S T O M Ser Hydrobiol. Vol 6 No 1 p 47-66, 1972. Illus. English summary.
Identifiers: Bellamya, Benthic studies, *Chad(Lake Chad), Cleopatra, Corbicula, *Factorial analysis, *Growth rate, Lakes, Melania, *Mollusks, Sediments.

After a brief account of basic principles necessary for a right interpretation of the method used, factorial analysis of correspondances was applies to samples taken during 2 missions in the Bol area (1967 and 1970) and 2 missions on the whole lake Chad (1968 and 1970). Individuality of populations for each type of bottom recorded in the Bol area was shown. In the lake as a whole and for the same grographical zone, the nature of the sediments has some influence on the specific composition of populations. Populations of the central part of the lake differ fundamentally from the populations of other biotopes by dominance of Melania and importance of Bellamya in their specific profile. On the other hand Cleopatra are dominant in the eastern part of the lake where Corbicula are also of importance. Presence of intermediate populations between the 2 preceding units, in which the relative importance of Melania and Cleopatra is quite the same, leads to the conclusion that they are 2 vicariantes species, that is one species can be substituted for the other species under particular conditions. This phenomenon could be observed in 1970 for populations living on the mud in the Bol area, as well as for some biotopes from the eastern zone of the lake. Apart from this evolution, stability is usually observed within a 2 yr period for the average samples of one biotope. There is no specific affinity between the 7 species studied.--Copyright 1974, Biological Abstracts, Inc.
W74-12332

DATA ON SELECTED LAKES IN WASHINGTON, PART II,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 5A.
W74-12341

FEASIBILITY STUDY TO DEVELOP GUIDELINES FOR LAKE AND RELATED LAND RESOURCE USE DEVELOPMENT RESEARCH, OR ECONOMIC AND ECOLOGICAL IMPACT OF VARIOUS FORMS OF LAKE RESOURCE DEVELOPMENT,
New Hampshire Univ., Durham. Water Resource Research Center.
R. A. Andrews.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 912, $3.25 in paper copy, $2.25 in microfiche. Completion Report, (1974). 32 p, 17 ref, 3 append. OWRT A-036-NH(1). 14-31-0001-4029.

Descriptors: *Land use, *Feasibilities studies, *Lake development, *Water resources development, *New Hampshire, New England, Water quality.
Identifiers: *Lake water quality, *Lake resource development, Ecological impact, Lake Winnepesaukee(NH), Squam lakes.

Many New Hampshire lakes are rapidly being developed, mainly for recreational purposes. The vacation cottage or second home is a major, but not the only, kind of development taking place. Concern over type and kind of development began in the late 1960s and early 1970s. This study investigated research approaches to answer numerous questions relating to guiding lake development. An attempt was made to develop an interdisciplinary project to analyze the impacts of alternative futures for lake and related land resources. Officially, New Hampshire does not have polluted lakes. This is solely based on coliform count. Eutrophia and weed problems, however, are numerous. Sources of major eutrophia problems are discussed. A wide range of current development found on lakes is discussed and oriented to historical development patterns, access and distance from large population centers. This development has given rise to a sizeable service industry and shopping centers. A number of communities have established good relations with the industries and spend sizeable amounts on providing public services. A brief review of the literature revealed some mixed results in terms of physical and economic impact on an area. Marinas and septic tanks may have helped maintain the quality of some lakes.
W74-12350

BASIC RESEARCH IN THE AQUATIC ENVIRONMENT: EFFECTS OF EUTROPHICATION ON PHYTOPLANKTON AND SELECTED SPECIES OF AQUATIC VASCULAR PLANTS-PHASE II,
Cornell Univ., Ithaca, N.Y. Dept. of Ecology and Systematics.
For primary bibliographic entry see Field 5C.
W74-12365

WATER QUALITY IMPROVEMENT OF STRATIFIED IMPOUNDMENTS BY SELECTIVE WITHDRAWAL OF BOTTOM WATERS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5G.
W74-12370

SPATIAL AND SEASONAL VARIATIONS OF THE MESOPLEUSTON OF THE YALCA POND (PROVINCE OF BUENOS AIRES, ARGENTINA), (IN SPANISH),
La Plata Univ. (Argentina). Instituto de Limnologia.
J. A. Schnack.

Physis Secc B Aguas Cont Org. Vol 32, No 84, p 1-12, 1973. English summary.
Identifiers: *Argentina(Yalca Pond), *Arthropoda, Azolla-Filiculoides, *Meso pleuston, Pearsons, Ponds, Salvinia-Rotundifolia, *Seasonal, *Spatial variation, Correlation index.

The spatial and seasonal variation of the mesoscopic fraction of the phylum Arthropoda in a representative area of Yalca Pond as related to the dominant floating plant species: Azolla filiculoides and Salvinia rotundifolia was studied. The use of Pearson's correlation index and the similarity of the recurrent groups proves the existence of interspecific relations among some elements of the pleuston community complex. The seasonal dynamics of populations was established by sampling in definite areas during 7 sampling periods throught the year.--Copyright 1974, Biological Abstracts, Inc.
W74-12399

COUGH RESPONSE AND UPTAKE OF MERCURY BY BROOK TROUT, SALVELINUS FONTINALIS, EXPOSED TO MERCURIC COMPOUNDS AT DIFFERENT HYDROGEN-ION CONCENTRATIONS,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5C.
W74-12507

DIATOMS OF THE CONCRETE EMBANKMENT OF THE ZEGRZE LAKE,
Inst. Bot., Wars. Univ., Warsaw, Pol. Warsaw Univ. (Poland). Inst. of Botany.
H. Borzdynska.
Acts Soc Bot Pol. Vol 42, No 1, p 21-40, 1973. Illus.
Identifiers: Amphora, Cymbella, *Diatoms, Lakes, Navicula, Nitzschia, *Poland(Zegrze Lake).

It was established that conditions for the development of diatoms on a concrete embankment are favorable. Beside organisms permanently or periodically connected with the solid substrate, typical planktons also occurred. The following species were most numerous: Cymbella affinis, Nitzschia kutzingiana, Amphora ovalis var. pediculus and Navicula gracilis. The most intensive development of diatoms was observed in April, May, July and Oct. The total number of organism depended on pollution of water in the Zeran Canal (Poland), increased water temperature in autumn in the section between the Canal and Bialobrzegi and intensity of waves.--Copyright 1973, Biological Abstracts, Inc.
W74-12528

STUDIES ON SOUTH AMERICAN FRESHWATER PLANKTON. NOTES ON THE PLANKTON FROM TIERRA DEL FUEGO AND VALDIVIA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
For primary bibliographic entry see Field 5C.
W74-12557

THE VEGETATION OF SWEDISH LAKES,
For primary bibliographic entry see Field 5C.
W74-12558

NOTES ON THE PLANKTON OF LAKE BANGWEULU,
For primary bibliographic entry see Field 5C.
W74-12559

ALGAE FROM LAKES IN NORTHERN COLORADO,
Vaxtbiologiska Institutionen, Uppsala (Sweden).
For primary bibliographic entry see Field 5C.
W74-12666

LAKE VATTERN. OUTLINES OF ITS NATURAL HISTORY, ESPECIALLY ITS VEGETATION,
Uppsala Univ. (Sweden). Inst. for Plant Ecology.
For primary bibliographic entry see Field 5C.
W74-12671

BIOGEOCHEMISTRY OF THE RARE-EARTH ELEMENTS IN AQUATIC MACROPHYTES OF LINSLEY POND, NORTH BRANDFORD, CONNECTICUT,
Pittsburgh Univ., Pa. Dept. of Biology.
For primary bibliographic entry see Field 5A.
W74-12687

EFFECT OF MARISA CORNUARIETIS ON POPULATIONS OF BIOMPHALARIA GLABRATA IN FARM PONDS OF PUERTO RICO,
San Juan Tropical Disease Lab., Puerto Rico.
W. R. Jobin, F. F. Ferguson, and L. A. Berrios-Duran.
Am J Trop Med Hyg. Vol 22, No 2, p 278-284. 1973. Illus.

Descriptors: *Farm ponds, Ponds, Mollusks, Gastropods, Snails, Population, Puerto-Rico, Reservoirs.
Identifiers: Biomphalaria-glabrata, Marisa-cornuarietis, Schistosoma-mansoni.

A biological control method is reported, utilizing an ampullarid snail, M. cornuarietis, to eliminate B. glabrata, the molluscan host of Schistosoma mansoni. The limitations and economics of this method required further clarification. This study was conducted in 9 small reservoirs in Puerto Rico to establish the probability of success of the method under various loading rates and vegetation conditions. Adult M. cornuarietis were transplanted from natural habitats into 7 of 9 study ponds, all of which contained stable populations of the planorbid snails. The snail populations were monitored for almost 2 yr after the initial loading with Marisa. Although the planorbid snail populations remained strong in the untreated ponds, they were controlled in 2 of the treated ponds and significantly reduced in 3 others. In the remaining 2 treated ponds there was no significant decrease in the B. glabrata populations. There was a close correlation between the success of the method and the amount of vegetation in the ponds. In the 2 ponds were the planorbid snails were controlled, there was very little vegetation. In the 2 ponds where the planorbid snails were controlled, there was very little vegetation. In the 2 ponds where the planorbids were not affected, the surfaces of the ponds were completely covered with vegetation. There was no correlation between the success of the biological control method and the rate at which the M. cornuarietis were added to the ponds. The average loading rate for all 7 ponds was 2 M. cornarietis per sq m of pond surface.--Copyright 1973, Biological Abstracts, Inc.
W74-12693

SPECIES AND QUANTITATIVE CONTENT OF THE PLANKTON AND BENTHOS OF THE AGGEL' LAKE, (IN RUSSIAN),
R. A. Safarov.
Izv Akad Nauk Az SSR Ser Biol Nauk. 4, p 55-57. 1972.
Identifiers: *Benthos, *Plankton, *USSR(Aggel Lake), Zooplankton.

In a study of the zooplankton organisms of the Aggel' lake (USSR) 11 spp. and forms were noted. Among zoobenthic organisms 48 spp. and forms were recorded. Two factors determine the character of the species and quantitative content of benthos. These are a low water temperature and transparency of the lake water. Benthos comprise 30.5% of the total fauna, with average biomass at 5.24-6.51 g/sq m with variations from 3.36 to 10.10 g/sq m. Leeches, mollusks, Odonata, caddix-flies and midge larvae were predominant.-Copyright 1974, Biological Abstracts, Inc.
W74-12708

MERCURY IN AQUATIC BIRDS AT CLAY LAKE, WESTERN ONTARIO,
Canadian Wildlife Service, Edmonton (Alberta).
For primary bibliographic entry see Field 5C.
W74-12717

FAUNA AND FLORA OF THE LAKES OF FARO AND GANZIRRI: III. BIOECOLOGIC OBSERVATIONS ON THE ECHINODERMS OF THE LAKE OF FARO (MESSINA), (IN ITALIAN),
Istituto Sperimentale Talassografico, Messina (Italy).
A. Cavaliere.
Biol Pesca Piscic Idrobiol. Vol 26, No 1/2, p 237-242, 1971. (English summary).
Identifiers: *Echinoderms, *Italy(Lake Faro), *Italy(Lake Ganzirri).

The morphological, biological and ecological characters of the species of echinoderms (Holothuria tubulosa, Astropecten irregularis pentacanthus, Asterina gibbosa, Ophioderma longicaudum, Arbacia lixula, Sphaerechinus granularis, Paracentrotus lividus) in the lake of Faro (Sicily) were examined with reference to their distribution.--Copyright 1973, Biological Abstracts, Inc.
W74-12732

DECOMPOSITION OF NITROGEN COMPOUNDS IN LAKE MUD IN VIEW OF NITROGEN ISOTOPE RATIOS: I. ANALYTICAL METHOD FOR NITROGEN COMPOUNDS IN SEDIMENTS,
Yokohama Sewerage Bureau, Kanagawa (Japan).
For primary bibliographic entry see Field 2K.
W74-12733

ON THE LITTORAL ALGAE OF THE LAKE NUUKSION PITKAJARVI, SOUTHERN FINLAND: I. ECOLOGY OF THE MOST IMPORTANT ALGAL SPECIES,
Helsinki Univ. (Finland). Dept. of Limnology.
For primary bibliographic entry see Field 5C.
W74-12738

STUDIES ON GILL PARASITOSIS OF THE GRASSCARP (CTENOPHARYNGODON-IDELLA) CAUSED BY DACTYLOGYRUS LAMELLATUS ACHMEROV, 1952: IV. HISTOLOGICAL CHANGES,
For primary bibliographic entry see Field 5C.
W74-12740

FOOD AND FEEDING HABITS OF SOME EGYPTIAN FISHES IN LAKE QUARUN: I. TILAPIA ZILLII (GERV.) B. ACCORDING TO DIFFERENT LENGTH GROUPS,
S. A. Abdel-Malek.
Bull Inst Oceanogr Fish. 2, p 204-213. 1972. Illus.
Identifiers: *Chrysophrys, *Egypt(Lake Quarun), Mugil, Solea, Tilapia, *Fish food organisms.

The material (Tilipia zillii, Solea vulgaris, Mugil saliens, M. cephalus, M. capito, Chrysophrys aurata) was collected over a 3 mo. period from May-July 1969. The results so obtained were analyzed by using the occurrence and the points methods. According to the present data, 3 major groups were formed: A-group:30-45 mm; B-group:46-90 mm and C-group:91-250 mm. In the 3 different length groups of Bolti, the plant material were the chief food items. The importance of the animal food increases to a certain extent as the fish grows larger. It is of interest to mention, that the small (30-45 mm long) feed on a limited number of small slow-moving organisms and as they grow larger their diet becomes more varied. The change in

composition of the diet as the fish grows is an expression of increase in the minimum size of the organism eaten. Small fish are unable to swallow the relatively large organisms such as mollusks (gastropods and Abra ovata) and polychaetes (Nereis spp.). As the fish grows larger the percentage of empty alimentary canals increases. This presumbly indicates that the fish eat more sporadically as they grow.--Copyright 1973, Biological Abstracts, Inc.
W74-12744

LONG-TERM CHANGES IN THE PARASITIC FAUNA OF SOME FISH IN THE DNIESTER BASIN, (IN RUSSIAN),
Zooveterynarnyi Instytut, Lvov (USSR).
O. P. Kulakovskaya, and V. M. Ivasik.
Gidrobiol Zh. Vol 9, No 1, p 70-75. 1973. (English summary).
Identifiers: Barbus, Chondrostoma, Cyprinus, Leuciscus, Perca, Rutilus, *USSR(Dniester basin), Vimba, *Fish parasites.

The specific structure, degree and intensity of infestation, as well as population density of parasites in 7 host fish species Rutilus rutilus, Vimba vimba Chondrostoma nasus, Perca fluviatilis, Leuciscus cephalus, Cyprinus carpio, Barbus barbus of the Upper Dniester Basin (USSR) showed remarkable changes within the period between 1952 and 1968. Total number of species decreased from 61-41. This reduction depends mainly on the outbreak of species with free swimming stages in their development, unprotected against the action of unfavorable environment factors.--Copyright 1973, Biological Abstracts, Inc.
W74-12746

PARASITES OF FISH FROM LAKE SAREZ (PAMIRS), (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 5C.
W74-12750

2I. Water In Plants

AN INCREASE IN EFFECTIVENESS OF MINERAL FERTILIZERS AND LIQUIDATION OF THEIR LOSSES DURING IRRIGATION, (IN RUSSIAN),
All-Union Inst. Fert. Soil Agric., Moscow.
S. G. Vasileva.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 5, p 16-18, 1973.
Identifiers: Corn, Cotton, *Fertilizers, Irrigation effects, Lucerne, Sugar beets, Winter wheat.

In experiments performed on soil seeded with winter wheat, corn for grain, corn for silage, sugar beets, lucerne and cotton, the basic condition for an increase in effectiveness of mineral fertilizers appears to be an optimal level of irrigation. The correct balance of irrigation and fertilization is needed for an increase in yield.--Copyright 1973, Biological Abstracts, Inc.
W74-12148

SANITARY AND HYDROBIOLOGICAL CHARACTERISTICS OF THE SAMUR-APSHERON CANAL, (IN RUSSIAN),
N. V. Gasanov, Kh. S. Eibazova, and Kh. A. Abdullaeva.
Izv Akad Nauk Az SSR Ser Biol Nauk. p 103-107, 1972. Illus.
Identifiers: Amphora, *Canals, Closterium-moniligerum, Cricotopus-algarum, Cricotopus-silvestris, Cyclops, Diaphanosoma-brachyurum, Diaptomus-salinus, Glyptotendipes-gripekoveni, *Hydrobiological studies, Microcystis-aeruginosa, Moina-rectirostris, Nematoda, Oscillatoria-sancta, Pedalia, Sanitary conditions, Tubifex-tubifex, *USSR(Samur-Apsheron canal).

Hydrobiological investigations of the Samur-Apsheron Canal (USSR) are presented. The incidences of Amphora, Microcystis aeruginosa, Oscillatoria sancta, Closterium moniligerum, Diaphanosoma brachyurum, Moina rectirostris, Diaptomus salinus, Cyclops, Pedalia, Tubifex tubifex, Glyptotendipes gr. gripekoveni, Cricotopus gr. silvestris, C. gr. algarum and Nematoda were determined. Hydrochemical, sanitary, microbiological and hydrobiological findings evidence the beta-mesosaprophytic nature of the Samur-Apsheron Canal.--Copyright 1974, Biological Abstracts, Inc.
W74-12153

RIVER AS A FEEDING PLACE FOR CROWS (CORVIDAE),
Wroclaw Univ. (Poland). Muzeum Zoologiczny.
Zbigniew Jakubiec.
Ekol Pol. Vol 20, No 43, p 509-535, Illus, 1972.
Identifiers: *Corvidae, Corvus-corone-cornix, Corvus-frugilegus, Corvus-monedula, *Crows, Feeding, *Food competition(Crows), Forests, Larus-ridibundus, Rivers, *Seasons, Towns.

The importance of a river as a feeding place for Corvus corone cornix, Corvus frugilegus and Corvus monedula was studied throughout a year. The relationship between diurnal activity and the importance of a river as a food supply during certain seasons of the year and the influence of riverside landscape (towns, open areas, forests) upon the number of birds feeding in certain sections of the river were indicated. The problem of food competition between C. c. cornix and Larus ridibundus was also discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-12158

ALLUVIAL GRASSLAND ECOSYSTEMS: HABITAT CHARACTERISTICS,
Ceskoslovenska Akademie Ved, Brno. Botanicka Ustav.
B. Ulehlova.
Prirodoved Pr Ustavu Cesk Akad Ved Brne. Vol 7, No 4, p 1-41. Illus, 1973.
Identifiers: *Alluvial grasslands, Alopecurus-pratensis, *Climate, Ecosystems, Festuca-sulcata, *Grassland habitat, Minerals, Nitrogen, Organic matter, Soil moisture.

The habitat characteristics were studied in 3 alluvial grassland communities, i.e., Serratulo-Festucetum commutatae, Gratiola officinalis-Carex praecoxsuzae and Glycerietum maximae arranged from the driest to the wettest one. The climatic data for the area and years of the investigations are given. The fluctuations of the groundwater table and of soil moisture content reach the highest and lowest values in the habitat of Glycerietum maximae and Serratulo-Festucetum commutatae, respectively. pF (water holding index) curves of the soils and the composition of the rain, flood and groundwater of all habitats are presented. Lysimetric measurements were taken, and the composition of soil percolates in different soil layers was assessed. The contents of soil organic matter and soil N and their fluctuations increase from the least productive dry to the most productive wet grassland ecosystem. The contents of organic matter and N were estimated in different fractions of the humus, i. e., in the free, sorbed, and chemically bound humic substances in the soils. The character of humus is different in the soils of each plant community. Finally, the mineral composition of the shoots, roots and litter was assessed for Festuca sulcata and Alopecurus pratensis during their ontogenesis. These 2 spp. are the respective dominants of Serratulo-Festucetum commutatae and Gratiola officinalis - Carex praecox-suzae.--Copyright 1974, Biological Abstracts, Inc.
W74-12161

A PHYTOCLIMATIC APPROACH TO THE PROBLEM OF MEDITERRANEITY IN THE INDO-PAKISTAN SUB-CONTINENT,
For primary bibliographic entry see Field 2B.
W74-12162

DATA ON THE HYDROBIOLOGY OF FISH PONDS OF SOUTHERN TADZHIK SSR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 8I.
W74-12167

PHYTOPLANKTON COLLECTED BY THE 'OMBANGO' OFF ANGOLA (10-27 NOVEMBER 1965), (IN FRENCH),
Museum National d'Histoire Naturelle, Paris (France). Laboratoire des Peches Outre-Mer.
J. Reyssac.
Bull Inst Fondam Afr Noire Ser A Sci Nat. Vol 34, No 4, p 796-808, 1972, Illus. English summary.
Identifiers: Ceratium-furca-var-furca, Chaetoceros-lorenzianum, Coasts, Dinophysis, Diversity, Index, Nutrients, Peridinium, *Phytoplankton, Rhizosolenia-acata-f-gracillima, Salinity, Soils, Stephanopyxis-palmeriana, Temperature, *Diatoms, *Dinoflagellates, *Africa(Angola).

Diatoms and dinoflagellates collected during the cruise of 'Ombango' along the Angola coast are inventoried. The 37 catches were made in an area comprised between 4 deg 52 min and 13 deg 55 min S i. e., from Pointe-Noire to a point south of Benguela. Catches come from the coastal waters but chiefly from the open sea extending to 9 deg 15 min E. Surface temperatures were near 24-25C. The salinity and varied considerably; a low salinity was noted southwest of Pointe-Noire; an area particularly reached by Congo waters. The thermocline is present in the whole area except near the coast (50 and 100 m depths) where it is divided in steps as a result of vertical movements. In all the catches, 55 spp. of Diatoms and 80 spp. of Dinoflagellates were identified. The flora is typically tropical. Populations generally are sparse and consist chiefly of Dinoflagellates (Ceratium, Peridinium, Dinophysis). However, a few blooms of diatoms appear south-west of Pointe-Noire beyond 1000 m depth and near Loanda in the coastal waters as well as in the offing. In front of Pointe-Noire, the fertility of waters is due to the arrival of freshwaters containing a great quantity of soil components. In front of Loanda, the fertility is caused by vertical movements particularly strong near the coast. The study of diversity index shows that these 2 areas have an intense activity, sharply contrasting with the other zones studied where populations have greater maturity. The main blooms were noted with the following species: Stephanopyxis palmeriana, Rhizosolenia alata f. gracillima, Chaetoceros lorenzianum. As the regards the genus Ceratium, especially diversified in the Angola waters, attention should be drawn to the different affinities of the 2 varieties of Ceratium furca: the variety furca is to be found mainly in the warm waters, the variety eugrammum in colder waters.--Copyright 1974, Biological Abstracts, Inc.
W74-12170

THE KUROSHIO II. PROCEEDINGS OF THE SECOND SYMPOSIUM ON THE RESULTS OF THE COOPERATIVE STUDY OF THE KUROSHIO AND ADJACENT REGIONS, TOKYO, SEPT 28-OCT 7, 1970.
Saikon Publishing, Co., Tokyo, 1972, 562 p, Illus, Maps.
Identifiers: Chlorophyll, Cooperative studies, *Fisheries, *Japan(Kuroshio region), *Oceanography, *Pacific Ocean, Plankton, Symposia, Thermocline, Zooplankton, Publications, Primary production.

An extensive number of papers, including introductory contributions on general aspects involving the Kuroshio and adjacent regions, are presented. The majority of the contributions are presented in 3 sections under the following categories: physics, chemistry and geology; biology and biochemistry; the fisheries oceanography. The first section includes papers on such topics as: occurrence of the thermocline in the shelf area south of Hong Kong; distribution of vanadium in the Kuroshio and adjacent regions; distribution of the bottom deposits on the Hong Kong fishing grounds; and study of the bottom sediments in the sea area of the west coast of Korea. The next section, covers such topics as: primary production in the western tropical and subtropical Pacific Ocean; composition of organic matter in subsurface chlorophyll maxima; herbivorous zooplankton-food zooplankton relationships in the Western North Pacific; and occurrence of ostracods in the neighboring seas of Taiwan. The final section covers such topics as: range of the skipjack tuna subpopulation in the western Pacific Ocean; studies on spotted mackerel resources of Taiwan; identification of Nemipterus in Thailand; and the occurrence and distribution of the fish eggs and larvae in the Korean adjacent Sea. Numerous maps, tables and other illustrations are included, and each paper lists literature cited.--Copyright 1974, Biological Abstracts, Inc.
W74-12171

AN OPTICAL PLANIMETER FOR LEAF AREA DETERMINATION,
Georgia Uiv., Athens. Inst. of Ecology., and Forest Service (USDA), Southeastern Forest Experiment Station. Franklin, N.C.
C. S. Gist, and W. T. Swank.
The American Midland Naturalist, Vol 92, No 1, p 213-217, July, 1974. 3 fig, 6 ref.

Descriptors: *Leaves, *Deciduous trees, Plant morphology.
Identifiers: Leaf area index.

An optical planimeter for determining leaf area is presented. The system proposed is simple and easily used, compact and somewhat portable, accurate and species-independent with respect to estimates of leaf area. Calibration and tests have shown the system exhibits a linear response to changes in leaf area. The system was not designed to stand the rigors of field use and may prove to be a disadvantage to certain users.
W74-12229

TEMPORAL CHANGES IN BIOMASS, SURFACE AREA AND NET PRODUCTION FOR A PINUS STROBUS L. FOREST,
Forest Service (USDA), Franklin, N.C. Southeastern Forest Experiment Station.
For primary bibliographic entry see Field 4A.
W74-12231

COMPARISON OF THREE METHODS OF ESTIMATING SURFACE AREA AND BIOMASS FOR A FOREST OF YOUNG EASTERN WHITE PINE,
Forest Service (USDA), Franklin, N.C. Southeastern Forest Experiment Station.
For primary bibliographic entry see Field 4A.
W74-12232

CHARACTERISTICS OF WATER REGIME OF MALE AND FEMALE DIOECIOUS PLANTS AS A SIGN OF ADAPTATION TO A POOR WATER SUPPLY, (IN RUSSIAN),
For primary bibliographic entry see Field 3F.
W74-12237

TREE WATER STRESS IN RELATION TO WATER YIELD IN A HARDWOOD FOREST,
New Hampshire Univ., Durham. Water Resource Research Center.
For primary bibliographic entry see Field 2D.
W74-12362

MIGRATION OF INSECTS CAUSED BY ERECTION OF IRRIGATIONAL MAINS, (IN RUSSIAN),
A. Yagdyev.
Izv Akad Nauk Turkm SSR Ser Biol Nauk. 5 p 82-83, 1971. English summary.
Identifiers: Agriotes-Caspicus, Gryllus-Desertus, *Insects, *Irrigation canals, *Migration(Insects), Tenebrionidae, Structures.

Insects (46 spp.) were recorded in newly developed virgin lands. Erection of the irrigation mains caused their migration. The species include such pests as Gryllus desertus, Tenebrionidae, and Agriotes caspicus.--Copyright 1974, Biological Abstracts, Inc.
W74-12396

THE STEINITZ LABORATORY OF MARINE BIOLOGY AT ELATH: AN OPEN DOOR ON THE TROPICAL SEAS, (IN FRENCH),
F. D. Por.
Cah Biol Mar. 14 p 407-411, 1973.
Identifiers: *Avicennia-Officinalis, Biology, Echinoderms, Fish, *Halophila-Sp, *Israel(Gulf of Aqaba), Mollusks, Plankton, Scleractinia, Seas, *Siganus-Sp, Tropical studies, *Marine laboratories.

The services and equipment of the Steinitz laboratory at Elath (Israel), on the Gulf of Aqaba, noted for its extreme narrowness, high saline stratification, clearness and absence of alluvial influences in its warm heliothermic bays, lagoons and reefs are discussed. Studies are conducted by Israeli and foreign biologists in the taxonomy, ecology, marine microbiology, electrophysiology, oceanography, sedimentology and limnology of the area which is rich in various species of Scleractinia, fish, mollusks and echinoderms. Plankton are very poorly represented in the Erythyrean region. Notable experiments have thus far been conducted with species of Siganus and populations of Halphila and Avicennia officialis.--Copyright 1974, Biological Abstracts, Inc.
W74-12398

DEPENDENCE OF PHOTOSYNTHESIS ON TEMPERATURE IN TUNDRA PLANTS OF WRANGEL ISLAND, (IN RUSSIAN),
Akademiya Nauk SSSR, Leningard. Botanicheskii Institut.
T. V. Gerasimenko.
Bot Zh. Vol 58, No 4, p 493-504. 1973. Illus, English summary.
Identifiers: Alopecurus-alpinus, Artemisia-furcata, Astragalus-umbellatus, Caltha-arctica, Carex-lugens, Claytonia-arctica, Dryas-punctata, Islands, Lagotis-minor, Nardosmia-frigida, *Photosynthesis, Plants, Rhodiola-borealis, Rumex-arcticus, Russian-SFSR, Salix-glauca, Salix-phlebophylla, Saussurea-tilesii, *Temperature, *Tundra, *USSR(Wrangel Island).

Temperature effect of the photosynthesis of arctic plants is of great interest. The dependece of photosynthesis on temperature during different terms of vegetative period had been studied by the radiometrical method in 14 spp. of higher plants (Claytonia arctica, Rhodiola borealis, Astragalus umbellatus, Lagotis minor, Artemisia furcata, Nardosmia frigeda, Saussurea tilesii, Dryas punctata, Salix glauca, S. phlebophylla, Carex lugens, Alopercurus alpinus, Caltha arctica, Rumex arcticus) from the Wrangel island (Russian S FSR USSR). Photosynthesis can take place in a wide range of temperatures, from minus 3 deg to plus 45 deg; the optimal temperature zone being about plus 20 deg, which is much higher than the prevailing temperature in natural habitat conditions. It is shown that the temperature optimum of photosynthesis remains the same all through the period of vegetation. The data presented show the wide range of adaptation of the plants' assimilation apparatus to different temperatures.--Copyright 1974, Biological Abstracts, Inc.
W74-12481

AQUATIC HIGHER VEGETATION AS A COMPONENT OF AN AQUATIC BIOGEOCENOSIS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Dept. of General Biology.
A. P. Belavskaya.
Gidrobiol Zh. Vol 9, No 1, p 31-35, 1973. English summary.
Identifiers: *Biogeocenosis, *Vegetation, USSR.

Significance of higher vegetation in the life of a water body and the necessity of its study by means of geobotanical methods are reviewed.--Copyright 1973, Biological Abstracts, Inc.
W74-12530

LEAF ANATOMICAL AND PHOTOSYNTHETICAL REACTIONS OF QUERCUS PUBESCENS WILLD. TO ENVIRONMENTAL FACTORS IN VARIOUS ECOSYSTEMS: I. LEAF ANATOMICAL REACTIONS,
National Museum of Natural History, Budapest (Hungary). Dept. of Botany.
G. Fekete, and J. Szujko-Lacza.
Acta Bot Acad Sci Hung. Vol 18, No 1/2, p 59-89, 1973. Illus.
Identifiers: *Leaves, Mesophyll, *Photosynthesis, Quercus-pubescens, *Oak trees.

The ecological inquiry of this work concerns the changes in 4 anatomical characteristics in the leaves of Quercus pubescens, under the influence of environmental factors. From 2 levels of light and water supply and the combinations of these, 4 habitat types were selected. The rate of palisade per spongy parenchyma and the size of the mesophyll chambers react in the same way to the combinations of the 2 factors. The effect of light along on the rate of palisade per spongy parenchyma is significant; while on the size of mesophyll chamber each of the 2 factors has a significant influence; on the intercellular rate and stoma frequency only the effect of the water factor is significant in itself. At a lower level of light intensity the leaf anatomical characteristics are more stable against the effects of the water supply of the soil than under more intensive light conditions. The intercellular rate is correlated with the size of mesophyll chambers and with stoma frequency. The mesophyll chamber can be conceived of not only as a unit of gas supply, but as the unit producing the transporting organic matter.--Copyright 1973, Biological Abstracts, Inc.
W74-12545

INDICATOR SPECIES IN THE DESMID STAURASTRUM,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5A.
W74-12597

BIOMASS, PRODUCTIVITY AND PHYTOGEOCHEMISTRY OF THE VEGETATION OF THE BANKS OF AN ARDENNE STREAM (GEMBES BROOK, AT DAVERDISSE, ARDENNE, LUXEMBOURG): III. SURVEY ON THE BIOMASS AND PRODUCTIVITY OF THE WOODY STRATUM OF AN ISLAND OF THE MACHE VALLEY),
Brussels Univ. (Belgium). Laboratoire de Botanique Systematique et d'Ecologie.
P. Kestemont, J. Timperman, and J. C. Moniquet.
Bull Soc R Bot Belg. Vol 105, No 2, p 309-319, 1972, Illus, English summary.
Identifiers: Alnus-glutinosa, Corylus-avellana, Luxembourg, *Vegetation, *Primary production, *Forests, Biomass, *Luxembourg.

Primary production of a forest of Alnus glutinosa and Corylus avellana established on a Mache's isle, near Daverdisse (Belgium) was determined. Surface of this isle has been estimated about 900 m2. On this isle, aerial biomass (wood and bark) reached 9.78 t and annual aerial productivity reached 876 kg/yr.--Copyright 1973, Biological Abstracts, Inc.
W74-12617

WATER STATUS OF HERBACEOUS DOMINANTS ON BOTTOM DEPOSITS FREED FROM LAKE SEVAN, (IN RUSSIAN),
N. A. Papikyan, and A. M. Barsegyan.
Tr Bot Inst Akad Nauk Arm SSR. 18, p 128-138. 1972.
Identifiers: Armenian-SSR, *Reeds, *Transpiration, Plant succession, *USSR(Lake Sevan), Lakes.

Investigations of the main indexes of the water status (transpiration rate, water deficit, water-retaining capacity) of the most widespread and characteristic plants of the Sevan bottom deposits (Armenian SSR, USSR) revealed that the establishment of formations and their successions depend on the ability of plants to regulate transpiration. Species not able to regulate transpiration under unfavorable environmental conditions disappear from the structure of the phytocenoses and, conversely, species manifesting a higher degree of plasticity to self-regulation of the water status become dominant. The common reed is the standard of self-regulation of transpiration on Sevan bottom deposits.--Copyright 1973, Biological Abstracts, Inc.
W74-12665

TYPOLOGICAL EVALUATION OF VEGETATION IN THE LOWER CIRCLE OF WESTERN PAMIR BASED ON EXPERIMENTAL STUDY ON THE CHANGEABILITY OF ASSOCIATIONS, (IN RUSSIAN),
Kh. Yu. Yusufbekov, and O. E. Agakhanyants.
Dokl Akad Nauk Tadzh SSR. Vol 15, No 11, p 52-55. 1972.
Identifiers: *Artemisia, *Plant associations, Stipabadachschanica, *Vegetation, *USSR(Western Pamir).

Two localities of Artemisia vachanica associations in this region, 2320 m above sea level, the one toward WSW, slope 8, the second to NW, slope 15, were studied and described repeatedly in 2 dry years (1959, 1971) and in a moist year (1972). This type of plant association is widely distributed in the lower vegetation circle of West Pamir (USSR) and is characterized by a quite rich composition of species. Observations showed that during the moist year, these associations, which before were evaluated as indisputable desert associations, acquired distinct features of steppe associations. This finding was one of the 3 main facts on which the new proposed typological reevaluation of associations in this region was based. The 2nd fact was the observation that A. vachanica during dry years was noticeably oppressed in these associations and that its generative shoots almost did not develop. During a rainy year the A. vachanica association in the locality toward WSW was transformed into a multigrass and mat-grass steepe (the edificator grass was Stipabadachschanica Roshev), increasing the grass yield 3-fold (from 3.8 to 10.2 centn/ha). Thus, increased moisture did call to life steppe associations that were considered to be desert associations.--Copyright 1973, Biological Abstracts, Inc.
W74-12678

SYSTEMATICS AND ECOLOGY OF THE ISEFJORD MARINE FAUNA (DENMARK): WITH A SURVEY OF THE EELGRASS (ZOSTERA) VEGETATION AND ITS COMMUNITIES,
Isefjord Lab., Vellerup Vig (Denmark).
E. Rasmussen.
Ophelia. Vol 11, No 1/2, p 1-495. 1973. Illus.

Descriptors: *Fjords, Sands, Mud, Aquatic animals, Fish, Saline water, Brackish water, Estuaries, Phytoplankton, Aquatic plants, Plankton, Water pollution, Shore protection, Wildlife, Environmental effects.
Identifiers: Chordates, *Denmark, Ecology, *Eelgrass, Fauna, Fishes, Isefjord, Mediomastus-fragilis, Pollution, Reproduction, Systematics, Vegetation, Zostera, Zostera-Marina, Vellerup Vig, Zealand, Roskildefjords, Invertebrates, North Atlantic.

This paper represents the results of more than 30 yr field observations and research work carried out from the Isefjord Laboratory, Vellerup Vig (Zealand, Demark). The Isefjord complex 36 km long, including the main fjord and the Roskilde Fjord, and covering about 400 sq km, is a shallow (7-10 m, maximum 30 m) area dominated by substrata of fine sand to mud with a high content of organic matter. The 1st part gives information about distribution, systematics, ecology and breeding of the majority of the 477 animal species described. Nearly 400 spp. are invertebrates and of the chordates 68 species are true fishes. Of all animal species, 63% have not previously been recorded from the area, 27 spp. are new to Danish seas and one (Mediomastus fragilis) (Polychaeta, Capitellidae) is new. The hydrography is treated mainly on the basis of literature. The fjord system may be classified as mixohaline: the Isefjord proper is polyhaline (18 + -30 plus or minus %), and the Roskilde Fjord is mesohaline (5 plus or minus 18 plus or minus %). From April to Aug. the Isefjord interior can be classified as a hypersaline estuary due to reduced precipitation and evaporation in connection with high water temperature. The water exchange between the fjord and the Kattegat is insignificant apart from that caused by wind pressure in winter and autumn. The tidal range (about 20 cm) is only of local importance. The water temperature essentially follows that of the air (shallow area) and normally fluctuates from negative temperatures with ice layer in the winter to summer temperatures often far above 20 degrees C. The recent climatic changes in the North Atlantic are discussed and it is shown that the surface water temperature increased considerably from 1930-50 not only in the Isefjord complex but in practically all interior Danish waters, while salinity changes have been of minor importance. The annual gross production of phytoplankton in the Isefjord is exceptionally high in comparison with that of other larger Danish seas and the primary production reaches values of a eutrophic freshwater lake. The eelgrass (Zostera marina) vegetation is treated in a special chapter and the extensive literature concerning the so-called disease and destruction of the eelgrass (1933-34) in northern Atlantic waters is discussed. Temperature and eelgrass conditions in the Isefjord suggest that recent climatic change (increased temperature) is the primary reason for the decline not disease or parasitic attack. The effect of the disappearance of the Zostera on environmental factors and fauna is demonstrated and the importance of the eelgrass as shore protection is shown. The final chapters give a broad ecological outline of the area and treat species composition and distribution, specific morphological variation, reproduction and larval development (for invertebrates) and the influence of environmental factors, especially temperature and salinity, on the fauna. Finally, pollution problems are discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-12681

VEGETATION CHANGES IN SHALLOW MARSH WETLANDS UNDER IMPROVING MOISTURE REGIME,
Canadian Wildlife Service, Saskatoon (Saskatchewan).
J. B. Millar.
Can J Bot. Vol 51, No 8, p 1443-1457. 1973. Illus.

Descriptors: *Marshes, Grasslands, *Vegetation, Cover crops, *Wetlands, Plant growth, Marsh plants, Shallow marshes, Waterfowl, Aquatic life, Habitats, Wildlife habitats, *Moisture.
Identifiers: Alopecurus-aequalis, Beckmannia-syzigachne, Eleocharis-palustris, Glyceria-grandis, Glyceria-pulchella, Polygonum-coccineum, Scolochloa-festucacea, *Canada(Saskatchewan).

Changes in species composition and plant cover were studied in relation to moisture regime over a 10-yr period in 71 shallow marsh-wetlands in the grassland and parkland regions of Saskatchewan (Canada). Decreases in density of the shallow marsh emergents Polygonum coccineum, Carex atherodes, Scolochloa festucacea and Eleocharis palustris occurred with greater-than-normal water depth at the start of the growing season, but 2 or more years of continuous flooding were required to eliminate emergent cover completely and convert the wetland to open water. Repeated autumn reflooding also resulted in complete elimination of emergent species. Changes in species composition occurred when basins were grazed and as vegetation reestablished after cultivation, but no changes followed mowing or burning. Alopecurus aequalis, Beckmannia syzigachne, Glyceria grandis and G. pulchella are designated as 'disturbance' species on the basis of their response to soil-exposing events. Presence of small amounts of deep marsh emergents in shallow marsh wetlands is not considered a reliable indicator of wetter moisture regime. Species composition of rooted submergents in a wetland can be used as an indicator of its moisture regime. Shallow marsh wetlands in basins of 1 ac (0.41 ha) or less experienced little year-long flooding and converted to open water only atypical conditions. Larger wetlands required basin depths in excess of 36 in. 996.4 cm) to have any amount of year-long flooding and to convert to open water. These basin size and depth criteria have applications in habitat evaluation by waterfowl managers.--Copyright 1974, Biological Abstracts, Inc.
W74-12682

FACTORS LIMITING THE DISTRIBUTION OF SALIX NIGRA,
Michigan State Univ., East Lansing. Dept. of Botany and Plant Pathology.
K. W. McLeod, and J. K. McPherson.
Bull Torrey Bot Club. Vol 100, No 2, p 102-110. 1973. Illus.

Descriptors: *Willow trees, Trees, Plant growth, Life cycles, *Oklahoma.
Identifiers: *Black willow, *Salix-Nigra.

Soil moisture, nutrient content, structure and aeration do not appear to limit the distribution of adult black willows in Oklahoma (USA). Instead, the species appears to be limited by the requirements for seed germination and seedling establishment which are met on moist or wet soil. These conditions usually exist only around a permanent source of water where the soil remains wet for an extended period. As determined by pot tests, established plants do not have a high moisture requirement and hence the species could survive in a broader range of environmental conditions than it is restricted to by its seedlings.--Copyright 1974, Biological Abstracts, Inc.
W74-12684

AZOTOBACTER CHROOCOCCUM IN THE PHYLLOSPHERE OF WATER HYACINTH (EICHHORNIA CRASSIPES MERT. SOLMS),
Indian Agricultural Research Inst., New Delhi. Div. of Microbiology.
V. Iswaran, A. Sen, and R. Apte.
Plant Soil. Vol 39, No 2, p 461-463. 1973. Illus.

Descriptors: *Water hyacinth, Floating plants, Aquatic plants, Aquatic weeds, Aquatic productivity, Growth rates, *Plant growth, Nitrogen.
Identifiers: *Azotobacter-chroococcum, Eichhornia-crassipes, Phyllosphere.

E. crassipes harbors A. chroococcum in large numbers on and in its leaves. This may account for the prolific growth of the plants in water containing only traces of combined N.--Copyright 1974, Biological Abstracts, Inc.
W74-12686

SEED WEIGHT IN RELATION TO ENVIRONMENTAL CONDITIONS IN CALIFORNIA,
California Univ., Berkeley. Dept. of Botany.
H. G. Baker.
Ecology. Vol 53, No 6, p 997-1010. 1972, Illus.

Descriptors: *Environmental effects, *Seeds, Weight, *Ecology, California, Shrubs, Trees.
Identifiers: Herbs, Ranunculus, Taxa.

Analyses of the California flora involving nearly 2500 taxa are presented which show that there are correlations between the weights of individual seeds and environmental conditions in which their producers normally grow. These differences in seed weight appear to be adaptive and result from compromises between increased nutrition of the seedling which would result from larger food reserves in heavier seeds and increased dispersibility and increased reproductive output which are provided when smaller seeds are produced in larger numbers. Literature and experiments show a general positive correlation between seed weights and rates of shoot and root growth, at least within species. Herbs (annual and perennial), shrubs and trees are necessarily treated separately in the calculations (for seed weights increase progressively in a series from annual herb to tree when the California flora or any particular community type within it are considered). Raw seed weights are reduced to a series of classes (on a logarithmic basis) before means for floras or community types are calculated. Generalizations arrived at from considerations of 'native' species in 'natural' plant communities are confirmed by their applicability to 'introduced' species now forming various kinds of 'weed' communities in California. Finally, species lists from actual stand analyses, including both 'native' and 'introduced' species, are utilized to provide the data for more precise analyses.--Copyright 1973, Biological Abstracts, Inc.
W74-12697

INTENSIVE CULTURAL PRACTICES INCREASE GROWTH OF JUVENILE SLASH PINE IN FLORIDA SANDHILLS,
Forest Service (USDA), Stoneville, Miss. Southeastern Forest Experiment Station.
J. B. Baker.
For Sci., Vol 19, No 3, p 197-202. Illus. 1973.
Identifiers: Control, Cultural, Fertilizers, *Florida, *Growth rates, *Irrigation, Juveniles, Moisture, Nitrogen, Nutrients, Phosphorus, *Pine(Slash), Pinus-elliotti, Sandhills, Soil, Weed.

Growth of slash pine (Pinus elliottii) planted on a well-prepared Florida, USA, sandhill site and treated with NP fertilizer, irrigation and weed control (applied singly and in factorial combination) was improved in almost direct proportion to the number of treatments applied. Five years after planting, untreated trees averaged 1.7 m tall, 1.52 cm dbh (diameter, breast height) and 821 cu cm in stemwood volume. In contrast, trees subjected to any single treatment, 2 combined treatments, or 3 combined treatments were about 45, 70 and 110% taller; 100, 150 and 230% larger in dbh; and contained 90, 170 and 330% more stemwood volume. Both available soil moisture and nutrients limited tree growth on these sites during various times of the year. Soil moisture deficiencies during the previous fall and current spring restricted elongation of the 1st flush of growth, while nutrient deficiencies limited elongation of subsequent or late flushes as well as diameter growth. Factorial combinations of treatments generally resulted in lower concentrations of N and K in current annual foliage, while fertilization caused slightly higher concentrations of foliar P. Both weed control and irrigation increased available soil moisture and thus decreased the number of days during the growing season that trees were growing under moisture stress.--Copyright 1974, Biological Abstracts, Inc.
W74-12701

ROOT ADAPTATIONS AND RELATIVE FLOOD TOLERANCE OF FIVE HARDWOOD SPECIES,
Clemson Univ., S.C. Dept. of Forestry.
D. Hook, and C. L. Brown.
For Sci., Vol 19, No 3, p 225-229. Illus. 1973.
Identifiers: Adaptations, *Flood tolerance(Trees), Fraxinus-pennsylvanica, *Hardwood, Liquidambar-styraciflua, Liriodendron-tulipifera, Nyssa-aquatica, Platanus-occidentalis, *Root system, Plant species.

Flooding experiments, in a growth chamber and a greenhouse, showed that height growth and root adaptations of yellow poplar, sycamore, green ash, sweet gum, and water tupelo (Liriodendron tulipifera L., Platanus occidentalis L., Fraxinus pennsylvanica Marsh., Liquidambar styraciflua L., Nyssa aquatica L., respectively) were correlated with flood tolerance. All except yellow poplar could be spatially separated along a relative flood tolerance scale by the presence or absence of 1 or more root adaptations. Water tupelo and green ash could be separated only by degree of development of root adaptations.--Copyright 1974, Biological Abstracts, Inc.
W74-12702

CONTRIBUTIONS TO WATER REQUIREMENTS OF WHEAT UNDER DESERT CONDITIONS,
Cairo Univ., Giza (Egypt). Dept. of Botany.
A. A. Abd-El-Rahman, and F. A. Marei.
Flora (Jena). Vol 161, No 5/6, p 539-554, 1972. Illus.

Descriptors: *Wheat, *Deserts, *Plant growth, Osmotic pressure, Wilting point, Drought tolerance, Transpiration, Penetration.

Wheat was grown at different levels of water supply 200-600 mm. A water supply equivalent to 200 mm was found to be the least level required for grain production. At this level the plant tissues suffered a water deficit of about 34%. Under dry conditions the maximum vertical depth reached by the root was 25.9 cm, whereas under wet conditions the maximum vertical depth attained by roots was 68.2 cm. Under unfavorable dry conditions the root demonstrated a consistent slow growth throughout the growth period. Under the favorable conditions, the root exhibited rapid growth in length in the 1st mo. after sowing, followed by very slow growth. It ceases to grow after 2 mo. The desiccation of leaves started in plants exposed to 4 wk of drought with 1 dry basal leaf. The permanent wilting percentage of the soil was reached when the dry period reached 7 wk. The plants, however, survived. The terminal bud was protected by the rolling top leaves and remained uninjured. The transpiration rate exhibited a pronounced decrease when the drought period exceeded 5 wk. Plants subjected to a 7 wk dry period suffered a saturation deficit of about 50%. The osmotic pressure exhibited a great rise with the extension of the drought period reaching 38.1 atm after 6 wk of drought compared with 16.3 atm after 3 wk from irrigation. Plants subjected to a drought period of 7 wk and more failed to produce grains; the ears were empty.--Copyright 1973, Biological Abstracts, Inc.
W74-12721

HYDROCHEMICAL LIVING CONDITIONS OF IMMATURE STAGES OF BOOPHTHORA ERYTHROCEPHALA DE GEER (DIPTERA, SIMULIIDAE): 1. FIELD STUDIES, (IN GERMAN),
Tuebingen Univ. (West Germany). Tropenmedizinisches Institut.
J. Grunewald.
Z Tropenmed Parasitol. Vol 23, No 4, p 432-445, 1972. Illus. (English summary).
Identifiers: *Boophthora, *Diptera, *Germany, Simuliidae, *Blackflies.

Over a period of 6 yr (1960, 1961, 1967-1970) water samples were collected at 149 sites from the great river systems of South-West Germany during all season and at various times of day. For analysis the following 19 factors were determined: water temperature, current velocity, pH value, conductivity, free CO2, O2 content, water hardness, Ca, Mg, alkalinity, consumption of potassium permanganate, chloride, sulfate, ammonia, nitrite, nitrate, phosphate, total Fe, and silicate. At 4 breeding sites of B. erythrocephala a characteristic combination of factors was found which was quite distinct from those of other species of blackflies. Rearing experiments carried out under laboratory conditions (Part 2) were based on this specific combination.--Copyright 1973, Biological Abstracts, Inc.
W74-12728

ECOLOGICAL STUDIES ON MENTHA PIPERITA L.: II. EFFECT OF DIFFERENT LIGHT INTENSITIES ON WATER RELATIONS,
Naples Univ. (Italy). Instituto di Botanica.
Virzo De Santo.
Oecol Plant. Vol 8, No 1, p 25-40, 1973. Illus.
Identifiers: Light, *Mentha-piperita, *Soil moisture, Plant growth, Growth rates.

Investigations were made on the water relations of M. piperita L. plants grown in full daylight (plot D) and at different percentages of natural sunlight, under artificial shades (plot C: 78%, plot B: 44% and plot A: 14% relative light intensity). This species exerts a marked control over water loss. In the more severe environmental conditions (higher evaporative demand and lower soil water supply) of the plot D, in full sunlight, the plants develop larger water deficits than the plants in the shaded plots. M. piperita plants at 44% relative light intensity (plot B) show higher relative transpiration rate than sun plants (plot D). This fact indicates that stomata in leaves of plot B show a smaller degree of closure and this favors any gas exchange. The present data offer a further explanation for equal growth rates of plants at 100% and 44% daylight despite the differing light intensities. At 14% daylight, M. piperita develops the extreme shade form with peculiar features.--Copyright 1974, Biological Abstracts, Inc.
W74-12730

LEISHMANIASIS IN BRAZIL: VI. OBSERVATIONS OF THE SEASONAL VARIATIONS OF LUTZOMYIA FLAVISCUTELLATA IN DIFFERENT TYPES OF FOREST AND ITS RELATIONSHIP TO ENZOOTIC RODENT LEISHMANIASIS (LEISHMANIA MEXICANA AMAZONENSIS),
Instituto Evandro Chagas, Belem (Brazil). Wellcome Parasitology Unit.
J. J. Shaw, and R. Lainson.
Trans R Soc Trop Med Hyg. Vol 66, No 5, p 709-717. 1972. Illus.
Identifiers: *Brazil, *Leishmania, *Leishmaniasis, Lutzomyia, Rodents, *Vectors(Biology), Human parasites.

The seasonal fluctuation of Lu. Flaviscutellata is closely related to rainfall. The population of this species declines during the rainy season (May-March) and increases again during the dry season, reaching a peak toward Dec. and Jan. The numbers of Lu. flaviscutellata caught in various types of forest were compared. This species is more common in the wetter forests of the 'igapo' than in the drier 'terra firme' forests, although similar

seasonal fluctuations are noted in both types of forest. The close correlation between the numbers of Lu. flaviscutellata and the incidence of initial infections of Le. mexicana amazonensis in Oryzomys capito indicates that the major factor controlling the incidence of leishmaniasis is the number of sandflies. (See also W74-12735)--Copyright 1973, Biological Abstracts Inc.
W74-12734

LEISHMANIASIS IN BRAZIL: VII. FURTHER OBSERVATIONS ON THE FEEDING HABITATS OF LUTZOMYIA FLAVISCUTELLATA (MANGABEIRA) WITH PARTICULAR REFERENCE TO ITS BITING HABITS AT DIFFERENT HEIGHTS,
Instituto Evandro Chagas, Belem (Brazil). Wellcome Parasitology Unit.
J. J. Shaw, R. Lainson, and R. D. Ward.
Trans R Soc Trop Med Hyg. Vol 66, No 5, p 718-723. 1972.
Identifiers: *Brazil, *Leishmaniasis, Lutzomyia-Flaviscutellata, Mangabeira, Oryzomys, Proechimys, *Vectors(Biology), Human parasite.

Lu. flaviscutellata is limited in its vertical distribution to a narrow zone just above the forest floor. The very high incidence of Leishmania mexicana amazonensis in ground-loving rodents of the genera Oryzomys and Proechimys, and the location of lesions in man caused by this parasite on the lower parts of the body, both appear to reflect the limited vertical distribution of the sandfly vector. The general lack of human infections of Le. m. amazonensis appears to be associated with the general reluctance of the vector, Lu. flaviscutellata, to bite man. When man enters an area where there are large numbers of Lu. flaviscutellata, such as in the wetter forests, the fly/man contact is raised to such a level that transmission of Le. m amazonensis to man is possible. Such conditions, as judged by the low incidence of Le. m. amazonensis in man, are rare and do not exist in the drier forests where man commonly contracts cutaneous and mucocutaneous leishmaniasis caused by Leishmania of the Le. braziliensis complex. (See also W74-12734)--Copyright 1973, Biological Abstracts, Inc.
W74-12735

ECO-PHYSIOLOGICAL STUDIES ON DESERT PLANTS: VIII. ROOT PENETRATION OF LEPTADENIA PYROTECHNICA (FORSK.) DECNE. IN RELATION TO ITS WATER BALANCE,
Cairo Univ., Giza (Egypt). Dept. of Botany.
K. H. Batanouny, and A. M. Abdel Wahab.
Oecologia (Berl). Vol 11, No 2, p 151-161. 1973. Illus.
Identifiers: *Leptadenia, *Soil moisture, Roots.

L. pyrotechnica is a leafless tree growing under adverse arid conditions in the valleys of the Eastern Desert in Egypt. The plant cover in areas inhabited by the species in very low and amounts to only 1% in some localities. In such an open vegetation competition between roots is lacking and each root system monopolizes a huge volume of soil. The root system of a small Leptadenia bush penetrates to a depth of 11.5 m and has a lateral extension of 10 m. The root system exploits about 850 cu m of soil. The distribution of the roots and their branching is closely related to the availability of the soil moisture in the different strata. The available soil moisture is not uniform throughout the whole profile. Depending on the average available soil moisture at the different depths, the total available moisture on the soil volume occupies by the root system of Leptadenia bush is found to be about 23,000 kg. The annual water output by the studied bush is found to be 5700 kg. This means that the available water in the soil occupied by the root system is sufficient to supply the plant for a period of 4 yr without replenishment by rainfall. The present study shows that the plant can live safely for several years under the severe conditions of the desert. The plant possesses some characteristics which help it to keep its water balance positive through increased absorption.--Copyright 1973, Biological Abstracts, Inc.
W74-12743

CHARACTERISTICS OF THE WATER REGIME OF PEAS AT DIFFERENT SOIL MOISTURE LEVELS AND WITH THE USE OF MOLYBDENUM, (IN RUSSIAN),
V. P. Zaslonkin.
Biol Nauki. Vol 16, No 2, p 82-86. 1973.
Identifiers: *Molybdenum, *Peas, Transpiration, *Soil moisture.

Under the effect of drought the total water content in pea leaves, rate of transpiration and water uptake by the root system decrease, whereas the content of bound water increases. Mo increases the content of total and bound water in pea levels. The transpiration rate under the effect of Mo under optimal water supply conditions of the plants increases in the morning and decreases during the afternoon and evening; under drought conditions it decreases all day. The uptake of water by the root system increases in the presence of an optimal water supply of the plants and decreases under drought conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-12749

2J. Erosion and Sedimentation

DEEP SEA DRILLING PROJECT, OPERATIONS RESUMES, LEG 19 THROUGH LEG 25, JULY 20, 1971 THROUGH AUGUST 22, 1972.
Scripps Institution of Oceanography, La Jolla, Calif.
Available from NTIS, Springfield, Va. 22161 as PB-212 399. Price $4.50 printed copy; $2.25 microfiche. Technical Report No 5, Contract Report for National Science Foundation, October 1972. 120 p. Contract NSF C-482.

Descriptors: *Oceanography, *Bottom sediments, *Core drilling, Core logging, Cores, Sampling, Boreholes.
Identifiers: *Deep Sea Drilling Project.

Operations resumes for Leg 19 through Leg 25 of the Deep Sea Drilling Project cover drilling and coring work in the deep oceans of the world. The Deep Sea Drilling Project is part of the National Science Foundation, National Ocean Sediment Coring Program. The resumes list technical achievements, drilling and coring results, drill bit performance and improvements, coring equipment modifications, tests of new procedures and equipment, improvements of drilling and coring procedures, plus problems encountered and anticipated and the steps taken or proposed. (Knapp-USGS)
W74-12017

SEDIMENT TRANSPORT BY STREAMS IN THE DESCHUTES AND NISQUALLY RIVER BASINS, WASHINGTON, NOVEMBER 1971-JUNE 1973,
Geological Survey, Tacoma, Wash.
L. M. Nelson.
Open-file report, 1974. 33 p, 19 fig, 2 tab, 13 ref.

Descriptors: *Sediment yield, *Sediment transport, *Washington, Sedimentation, Reservoir silting, Sediment load, Erosion, Topography.
Identifiers: *Deschutes River basin(Wash), Nisqually River basin(Wash).

Fluvial-sediment transport was studied in the Deschutes and Nisqually River basins, Washington. These two adjacent basins in southwestern Washington cover about 874 square miles and range in altitude from sea level to about 14,400 feet on Mount Rainier. The topographic relief is modified by glaciation, and landforms include steep mountain slopes, rolling foothills, and lowland glacial-drift plains separated by river flood plains. Abundant precipitation, ranging from slightly less than 40 inches to more than 140 inches sustains a thick vegetative cover over most of the area. The measured suspended-sediment concentrations in streams in the two basins ranged from less than 1 to 8,650 milligrams per liter and reflected a rapid increase in concentration with increasing streamflow. The probable annual suspended-sediment yields ranged from 20 tons per square mile to 2,500 tons per square mile. Probable annual sediment discharge of the Deschutes River at Olympia is 25,000 tons, while that of the Nisqually River near Nisqually is 105,000 tons. Annually, most of the sediment is transported in a few days during periods of high streamflow. Little sediment is eroded from the lowlands; most of the sediment originates in the mountains. Except for deposition of sediment in Alder Reservoir and Capitol Lake, only slight changes in the sediment-transport pattern probably occur as a result of human activity. (Knapp-USGS)
W74-12058

FIELD AND MODEL STUDIES ON A SILTATION PROBLEM IN THE FRASER RIVER,
Department of Public Works, Vancouver (British Columbia).
For primary bibliographic entry see Field 8A.
W74-12089

LABORATORY STUDY OF SCOUR AT CHANNEL BENDS,
Research Council of Alberta, Edmonton.
For primary bibliographic entry see Field 8B.
W74-12094

A COMPUTER SIMULATION OF THE MOTION OF A SOLID PARTICLE IN A TURBULENT FLOW WITH FREE SURFACE,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 8B.
W74-12106

DETERMINATION OF TRACE METAL POLLUTANTS IN WATER RESOURCES AND STREAM SEDIMENTS,
Dayton Univ., Ohio.
For primary bibliographic entry see Field 5A.
W74-12194

METAL DISTRIBUTION ALONG A PROFILE OF AN INTER-TIDAL AREA,
Stockholm Univ. (Sweden). Geological Inst.
For primary bibliographic entry see Field 5B.
W74-12280

THE HYDROMETER METHOD FOR DETAILED PARTICLE-SIZE ANALYSIS: 1. GRAPHICAL INTERPRETATION OF HYDROMETER READINGS AND TEST OF METHOD,
Agriculture Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
M. T. Kaddah.
Soil Science, Vol 118, No 2, p 102-108, August 1974. 3 fig, 2 tab, 21 ref.

Descriptors: *Sediment distribution, *Particle size, *Hydrometers, *Stokes Law, *California, Soil properties, Soil physics, Silts, Clays.
Identifiers: *Imperial Valley(Calif), Bouyoucos hydrometer, Casagrande's method, Pipet method.

The hydrometer method usually has been tested against the pipet method for determination of total silt and clay (50-2 microns, less than 2 microns in diameter). For analysis of more silt and clay size fractions (i.e., 50-20, 20-10, 10-5, 5-2, 2-1, less than

1 micron), this study showed no difference between the two methods. The hydrometer method also gave, by subtraction, results comparable to the wet sieve method for particles greater than 43 and 53 microns. Frequent insertion and removal of the hydrometer from suspension, as needed in detailed particle-size analysis, did not affect the accuracy of the hydrometer method. Hydrometer specifications were used to calculate and plot hydrometer readings versus particle diameter at different time intervals after initiation of sedimentation. The procedure facilitated calculation of particle size distribution. (Gibb-ISWS)
W74-12303

LITHOFACIES RELATIONS IN THE LATE QUATERNARY NIGER DELTA COMPLEX,
Koninklijke Shell Exploratie en Produktie Laboratorium, Rijswijk (Netherlands).
For primary bibliographic entry see Field 2L.
W74-12305

ESTIMATION OF RAINFALL EROSION INDEX,
Engineering-Science, Inc., Berkeley, Calif.
J. K. H. Ateshian.
Journal of the Irrigation and Drainage Division, Proceedings of the American Society of Civil Engineers, Vol 100, No IR3, p 293-307, September 1974. 7 fig, 5 tab, 8 ref, 2 append. EPA Contract 68-01-0755.

Descriptors: *Erosion control, *Soil erosion, *Rainfall, *Soil conservation, *Drainage, Overland flow, Erosion, Rainfall intensity, Rainfall disposition, Graphical analysis, Maps.
Identifiers: Soil loss.

The rainfall erosion index in the Universal Soil-Loss Equation was intensively studied using an analytic approach. Simplified procedures for its computation were developed and presented. The methodology ties together the eastern and western portions of the United States and is based primarily upon the rainfall distribution curves as published by the Soil Conservation Service and secondarily upon the kinetic energy and rainfall intensity relationship. With this improvement the Soil-Loss Equation may become truly 'universal.' (Yang-ISWS)
W74-12321

MEASUREMENTS OF SAND TRANSPORT BY WIND ON A NATURAL BEACH,
For primary bibliographic entry see Field 2L.
W74-12334

ATLANTIC CONTINENTAL SHELF AND SLOPE OF THE UNITED STATES--SEDIMENT TEXTURE OF THE NORTHEASTERN PART,
Geological Survey, Washington, D.C.
J. Schlee.
Available from Sup Doc, GPO, Washington, DC 20402, Price $4.05 including plates. Professional Paper 529-L, 1973. 64 p, 39 fig, 6 plate, 154 ref.

Descriptors: *Bottom sediments, *Continental shelf, *Atlantic Ocean, Distribution patterns, Sediment sorting, Sedimentology, Provenance, Particle size, Marine geology, *Northeast U.S.

The Atlantic continental margin of the northeastern United States is covered by fine to medium quartzone sand out to the shelf edge and by silt and clay on the continental slope and rise. On the glaciated part of the continental shelf (Gulf of Maine), sediment is mainly till-like mixtures of sand, gravel, silt, and clay; in basins of the gulf, pelagic silty clay covers older glacial deposits. Adjacent to the rocky shelf around Nova Scotia, coarse gravel is prevalent. The southern limit of glaciation is marked by a fringe of gravelly sand (former outwash deposits) and sandy gravel. The shelf south of the glacial limit is mainly a sand-covered plain transected by wide channels carved by a dendritic drainage pattern. Relict terraces inherited from lower stands of sea level are also prevalent in this area, particularly on the outer shelf. Sandy debris has been redistributed so widely over Georges Bank and the inner shelf elsewhere, that the channelways for glacial melt water are now buried. Fine-grained sediment on the shelf is mostly confined to inshore areas such as estuaries, bays, and sounds. The bathymetric transition to the deep sea is marked by a change to finer grained sediment on the continental slope. The sand fraction lessens and changes from dominantly quartz and feldspar to mainly Foraminifera tests. (Knapp-USGS)
W74-12337

COASTAL - ESTUARINE AND NEARSHORE PROCESSES, AN ANNOTATED BIBLIOGRAPHY,
Ocean Engineering Informaton Service, La Jolla, Calif.
For primary bibliographic entry see Field 2L.
W74-12351

EFFECTS OF SUSPENDED SILT ON DISSOLVED PHOSPHORUS LEVEL IN THE GALLATIN RIVER,
Montana State Univ., Bozeman. Dept. of Plant and Soil Science.
For primary bibliographic entry see Field 5B.
W74-12361

THE BOSPORUS,
Stanford Research Inst., Irvine, Calif.
For primary bibliographic entry see Field 2L.
W74-12372

ROLE OF THE BOSPORUS IN BLACK SEA CHEMISTRY AND SEDIMENTATION,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
For primary bibliographic entry see Field 2L.
W74-12373

EXPEDITION 'ODYSSEUS 65': RADIOCARBON AGE OF BLACK SEA DEEP WATER,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 2E.
W74-12374

EVOLUTION OF ANOXIC CONDITIONS IN BLACK SEA DURING HOLOCENE,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-12375

DISTRIBUTION OF SOME TRACE ELEMENTS IN BLACK SEA AND THEIR FLUX BETWEEN DISSOLVED AND PARTICULATE PHASES,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-12376

PHOSPHORUS IN BLACK SEA,
Fishery Board of Sweden, Gotenburg. Hydrographic Dept.
For primary bibliographic entry see Field 5B.
W74-12377

RELATION BETWEEN CHLORINITY AND CONDUCTOMETRIC SALINITY IN BLACK SEA WATER,
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 2K.
W74-12378

INTERSTITIAL WATERS OF BLACK SEA SEDIMENTS: NEW DATA AND REVIEW,
Geological Survey, Woods Hole, Mass.
For primary bibliographic entry see Field 2K.
W74-12379

RECENT SEDIMENTS OF BLACK SEA,
Woods Hole Oceanographic Institution, Mass.
D. A. Ross, and E. T. Degens.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 183-199, 1974. 11 fig, 1 tab, 46 ref. NSF Grant GA-1659.

Descriptors: *Sedimentation, *Density stratification, *Sedimentation rates, Pleistocene epoch, Bottom sediments, Water chemistry, Sulfides, Salinity.
Identifiers: *Black Sea.

The deep-water sediments deposited during the last 25,000 years in the Black Sea are distinguished by three sedimentary units: unit 1--carbonate-rich microlaminated sediment, deposited within the last 3,000 years; unit 2--organic-rich microlaminated sediment commonly about 40 cm thick, deposited between 3,000 and 7,000 years B.P. and unit 3--alternately light and dark lutite, deposited between 7,000 and at least 25,000 years B.P. Generally, the sedimentation rates ranged from about 40 to 90 cm/1,000 years during the deposition of unit 3, and averaged about 10 cm/1,000 years during the deposition of units 1 and 2. These changes in sedimentation rate coincide with major changes in the environmental conditions of the Black Sea. Unit 3 was deposited during a period when the Black Sea was changing (because of Pleistocene sea-level changes) from a marine to a freshwater aerobic lake. At about 9,000 years B.P. and continuing to 7,000 years B.P., seawater occasionally spilled over the Bosporus and entered the Black Sea. The entrance of this water began the change from the freshwater well-aerated phase to the marine stagnant phase. At about 7,000 years B.P. the H2S zone was well established in the deep basin, and deposition of unit 2 began there. On the basis slope the deposition of unit 2 began about 6,200 years B.P., because of the rising H2S-oxygen boundary. Sedimentation rates dropped as a result of rising sea level in the Black Sea which permitted river-carried sediment to be trapped in the estuaries or on the shelf. About 3,000 years ago the conditions that presently characterize the Black Sea were reached. (Knapp-USGS)
W74-12380

MINERALOGY AND PETROLOGY OF BLACK SEA BASIN SEDIMENTS,
Heidelberg Univ. (West Germany). Sediment Research Lab.
G. Muller, and P. Stoffers.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A. editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 200-248, 1974. 22 fig, 10 tab, 40 ref, append.

Descriptors: *Sedimentation, *Provenance, Pleistocene epoch, Sea water, Bottom sediments, Mineralogy, Sands, Carbonates, Mud, Clay minerals, Sedimentology.
Identifiers: *Black Sea.

The origin and modes of transportation and deposition of inorganic sedimentary material of the Black Sea were studied in approximately 60 cores. The sediment derived from the north and northwest (especially from the Danube) has a low calcite-dolomite ratio and a high quartz-feldspar ratio. Rock fragments are generally not abundant; garnet is the principal heavy mineral and illite is the predominant clay mineral. Sediment carried by Anatolian rivers is characterized by a high calcite-dolomite ratio and a low quartz-feldspar ratio.

Rock fragments are abundant; pyroxene is the principal heavy mineral and montmorillonite is the predominant clay mineral. Clay content increases from the coasts toward two centers in the western and eastern Black Sea basin. Illite is the most common clay mineral. In almost all cores, a rhythmic change of the montmorillonite-illite ratio with depth was observed. These changes may be related to the changing influence of the two provinces during the Holocene and late Pleistocene. The carbonate content of the contemporary sediments ranges from 5% to 65%. It increases from the coast to a maximum in two centers in the western and eastern basin. The contemporary mud sedimentation is governed by two important factors: (1) the deposition of terrigenous allochthonous material of low carbonate content originating from the surrounding hinterland (northern and southern source areas), and (2) the autochthonous production of large quantities of biogenic calcite by coccolithophores during the last period of about 3,000-4,000 years. (Knapp-USGS)
W74-12381

MODERN SEDIMENTATION IN BLACK SEA,
Akademiya Nauk SSSR, Gelendzhik. Institut Okeanologii.
K. M. Shimkus, and E. S. Trimonis.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 249-278, 1974. 16 fig, 23 tab, 62 ref.

Descriptors: *Bottom sediments, *Particle size, *Mineralogy, *Sedimentology, Provenance, Distribution patterns, Sediment sorting, Kaolinite, Illite, Montmorillonite.
Identifiers: *Black Sea.

The deep-water sediments of the Black Sea are mainly fine grained; coarse material is found locally on the basin slope and deeper areas, especially in the southeastern part of the basin. The latter accumulation is material deposited by turbidity currents. There is a grain-size differentiation of clay minerals; kaolinite occurs nearer the coasts; montmorillonite and illite are more common in the deeper areas. The grain size and mineral distribution are controlled by many factors, including inflow of terrigenous material, original size of source material, production of biogenic carbonate, action of currents, and redeposition by slumping and turbidity currents. (Knapp-USGS)
W74-12382

SOME CHARACTERISTICS OF CARBONATE SEDIMENTATION IN BLACK SEA,
Akademiya Nauk SSSR, Gelendzhik. Institut Okeanologii.
E. S. Trimonis.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 279-295, 1974. 10 fig, 3 tab, 28 ref.

Descriptors: *Deposition(Sediments), *Carbonates, *Sedimentation, Limestones, Suspended load, Chemical precipitation.
Identifiers: *Black Sea.

About 10.8 million tons per year of detrital carbonate material is brought into the Black Sea in suspension by rivers; more than 25 million tons is carried in solution. In addition, authigenic carbonates, principally mollusk shells and coccoliths, are formed within the Black Sea. The grain-size of carbonate sediments varies as a function of composition and origin. Carbonate material consists mainly of low-magnesium calcite and aragonite. Biogenic prosesses are the major factor in modern carbonate sedimentation. Terrigenous carbonate material also is significant in the general process of carbonate sedimentation. (Knapp-USGS)
W74-12383

GRADED BEDDING IN RECENT BLACK SEA TURBIDITES: A TEXTURAL APPROACH,
Institutul Geologic, Bucharest (Rumania).
D. C. Jipa.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 317-331, 1974. 18 fig, 20 ref.

Descriptors: *Bottom sediments, *Turbidity currents, *Sediment sorting, *Particle size, *Sediment transport, Density currents, Sedimentation, Deposition(Sediments), Currents(Water), Stratigraphy.
Identifiers: *Black Sea.

Several types of graded bedding are recognized in sediments collected from the central Black Sea. The grading types, matrix content, grain-size distribution, and pulsations in the vertical size distribution provide data on the dynamics of the turbidity currents that deposited these sediments. Several features indicate that the evolution of the sedimentation process of the Black Sea graded beds was governed mainly by the decreasing energy of the transporting turbidity currents. This conclusion is substantiated by: (1) the decreasing content of sand toward the top of the bed and the increasing content of fine-sized particles; (2) increasing percentage of a population representing the increasing importance of the suspended load versus bed load; and (3) matrix size grading and the increasing percentage of matrix present toward the top of the bed. (Knapp-USGS)
W74-12384

MASS PHYSICAL PROPERTIES OF SOME WESTERN BLACK SEA SEDIMENTS,
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Lab.
G. H. Keller.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 332-337, 1974. 4 fig, 15 ref.

Descriptors: *Bottom sediments, *Organic matter, *Sedimentology, Density stratification, Sampling, Stratigraphy, Provenance, Sedimentation.
Identifiers: *Black Sea, Sapropels.

Three distinct and unusual sedimentary units can be traced over large parts of the Black Sea basin. These units extend at least through the cored interval (2 m) and they have mass physical properties distinct from those of other marine sediments. On the abyssal plain, the uppermost unit (0-18 cm) consists of alternate microlaminated layers of coccolith and sapropelic mud characterized not only by its composition, but by its high carbonate content (44-81 percent) and intermediate specific gravities of grains (2.19-2.47). The underlying unit (18-62 cm) is composed of highly organic material with properties more closely related to those of peat than those of deep-sea sediments. Water content as high as 700 percent, porosities of 95 percent, unit weights as low as 1.07 g/cc, and grain specific gravities of 1.89-2.33 typify this unusual deposit. Unit 3 (62 cm to bottom of cored interval) is characterized by light- and dark-gray silty clay, relatively high specific gravities of grains (2.57-2.74), and remarkably low shear strengths (10-38 g/cc) weights (1.25-1.50 g/cc). (Knapp-USGS)
W74-12385

BOTTOM PHOTOGRAPHS OF BLACK SEA,
Woods Hole Oceanographic Institution, Mass.
A. C. Vine.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 338-346, 1974. 11 fig, 7 ref.

Descriptors: *Bottom sediments, *Photography, Sedimentology, Sedimentation, Sedimentary structures, Sounding, Acoustics, Equipment.
Identifiers: *Black Sea, *Underwater photography.

Bottom photographs from six locations in the anaerobic deep central parts of the Black Sea show no marine life or evidence of bottom activity of marine life, but they do show considerable evidence of small debris. Most of the bottom appears mottled, suggesting a closely spaced, uniformly random grouping of small sediment dumps. Some photographs show slight patterns, ranging from a few centimeters to 1 m long, that perhaps result from the descent to the bottom of floating debris, vegetation, or dead marine life. Several different types of lineal patterns on the bottom indicate the action of weak bottom currents. Stereo photos show two lineal-type patterns with no observable relief. These patterns presumably are due to differences in reflective power or to very small textural changes. (Knapp-USGS)
W74-12386

GEOCHEMISTRY OF SEDIMENTS FROM ELEVEN BLACK SEA CORES,
Durham Univ. (England). Dept. of Geochemistry.
D. M. Hirst.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 430-455, 8 tab, 58 ref, append. NSF Grant GA-1659.

Descriptors: *Geochemistry, *Bottom sediments, Statistics, Sampling, Cores, Clay minerals, Provenance, Carbonates, Stratigraphy, Organic matter, Silicates, Sulfur, Sulfides.
Identifiers: *Black Sea, *Factor analysis.

The interrelations among 25 chemical variables in 172 samples of Black Sea sediments were assessed by means of factor analysis. The main variance is controlled by the relative amounts of silicate phases, carbonate, organic carbon, and sulfur in the sediments, and is related to the Eh and pH of the depositional environment. Part of the variance is ascribed to variation in the clay mineralogy and is related to a southern and southwestern provenance for chlorite and montmorillonite. Trend-surface analyses of factor scores indicate both areal and stratigraphic variations in the chemistry, which are notable on the bipolar carbonate-silicate factor and the factor containing loadings for carbon and related elements. Both carbonate and organic carbon are relatively concentrated in sediments from the central Black Sea, particularly in the upper most 100-200 cm of the cores. A threefold stratigraphy comprises a thin recent carbonate sequence overlying sapropelic muds, which in turn overlie more normal lutite. This stratigraphy is recognized most easily in cores from the central Black Sea. Near the southern margin, it is obscured by a high rate of accumulation of detrital silicates; in the eastern Black Sea, deposition of turbidites produces nonstandard sequences. (Knapp-USGS)
W74-12387

INFLUENCE OF ORGANIC MATERIAL AND PROCESSES OF SULFIDE FORMATION ON DISTRIBUTION OF SOME TRACE ELEMENTS IN DEEP-WATER SEDIMENTS OF BLACK SEA,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 2K.
W74-12388

ORGANIC ANALYSES OF BLACK SEA CORES,
California Univ., Berkeley. Space Sciences Lab.
B. R. Simoneit.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 477-498, 1974. 11 fig, 11 tab, 25 ref. NASA Grant NGL-05-003-003.

Descriptors: *Organic matter, *Bottom sediments, Organic compounds, Cores, Sampling, Chemical analysis.
Identifiers: *Black Sea, Sapropels.

Samples from three Black Sea coring sites (1461, 1462, and 1474) were analyzed for their solvent-soluble organic matter. The organic carbon content of these samples ranges from less than 1 percent to about 20 percent; significant amounts of carbonate, terrigenous clays, and terrestrial organic detritus are present. Up to 2.5 percent of the samples is solvent extractable, and the extracts consist mainly of carboxylic acids and hydrocarbons, some with large amounts of elemental sulfur. The hydrocarbons consist of mainly normal alkanes, isoprenoidal hydrocarbons--mainly phytadienes, phytane, and pristane; and a series of isoalkanes. In the high-resolution mass spectrametric and GC/MS data, there also were indications for the presence of steroidal and triterpenoidal compounds. The carbon-rich sample from the 40-cm level at site 1461 yielded an extract consisting mainly of sterols and fatty acids. Its hydrocarbon content is predominantly olefinic alkanes and polycyclic material. (Knapp-USGS)
W74-12389

FORMS OF IRON IN SURFACE LAYER OF BLACK SEA SEDIMENTS,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
A. G. Rozanov, I. I. Volkov, and T. A. Yagodinskaya.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 532-541, 1974. 4 fig, 2 tab, 12 ref.

Descriptors: *Iron, *Bottom sediments, *Geochemistry, Oxidation, Reduction(Chemical), Organic matter, Dissolved oxygen, Pyrite, Sulfides, Hydration.
Identifiers: *Black Sea.

Early diagenesis of iron under oxidizing and reducing conditions in sediments of the Black Sea was studied in detail. Generally, reactive iron in sediments increases in the direction from the coastal areas to the center of the sea. The mineral forms of reactive iron (hydrates, silicates, sulfides) are strongly affected by the kind and amount of organic matter in the sediments. Reducing conditions exist not only in sediments of the deep basin but with exception of the upper few centimeters, they also are present in shallow-water sediments which are laid down under oxidizing conditions. (Knapp-USGS)
W74-12390

BEHAVIOR OF MOLYBDENUM IN PROCESSES OF SEDIMENT FORMATION AND DIAGENESIS IN BLACK SEA,
Akademiya Nauk SSSR, Gelendzhik. Institut Okeanologii.
M. F. Pilipchuk, and I. I. Volkov.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 542-553, 1974. 8 fig, 4 tab, 44 ref.

Descriptors: *Molybdenum, *Bottom sediments, *Oxidation-reduction potential, Distribution patterns, Sulfides, Dissolved oxygen, Geochemistry, Diagenesis, Adsorption, Chemical precipitation.
Identifiers: *Black Sea, Sapropels.

In the Black Sea the distribution of molybdenum is markedly affected by redox reactions. Sediments deposited under oxidizing conditions can scavenge molybdenum by coprecipitation with manganese oxides and hydroxides. In contrast, the high molybdenum content in sediments of the H2S zone can be attributed to the diagenetic fixation of molybdenum to organic matter and also to incorporation of molybdenum in pyrite. Enrichment of molybdenum during the lifetimes of planktonic organisms is not significant in accounting for the high concentrations of this element in the organic-rich sediments. (Knapp-USGS)
W74-12391

ISOTOPIC AND ELEMENTAL GEOCHEMISTRY OF BLACK SEA SEDIMENTS,
Bureau of Mineral Resources, Canberra (Australia).
J. A. Cooper, E. J. Dasch, and M. Kaye.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 554-565, 1974. 7 fig, 6 tab, 34 ref.

Descriptors: *Bottom sediments, *Provenance, *Geochemistry, Radioisotopes, Stable isotopes, Strontium radioisotopes, Lead radioisotopes.
Identifiers: *Black Sea.

In the Black Sea, sediment provenance approximates average continental material. Except for basaltic rock, sediment sources for the Black Sea are extremely varied, both lithologically and temporally. Thus, excluding variations in trace elements, the chemistry of Black Sea sediment on a carbonate-free basis closely approaches values for an average cratonic shale. Varied continental provenance also is defined by lead-isotope ratios, which are closer to numbers obtained from crustal rock than from oceanic-basaltic, more deeply derived rock. Additionally, strontium-isotope composition of the sediments reflects moderately radiogenic sources; the range and average for the Black Sea Sr ratios are close to those of deep-sea detritus from the western North Atlantic. (Knapp-USGS)
W74-12392

QUANTIFICATION OF SHORELINE MEANDERING,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
L. Vincent.
Available from NTIS, Springfield, Va. 22161 as AD-773 050, Price $4.00 printed copy, $2.25 microfiche. Technical Report No 7 for Office of Naval Research, Geography Programs, November 1973. 89 p, 16 fig, 18 tab, 6 append. ONR Nonr-N00014-69-A-0060-0006.

Descriptors: *Meanders, *Beaches, *Sand waves, Topography, Geomorphology, Statistical models, Water circulation, Littoral drift, Beach erosion, Waves(Water), Surf, *North Carolina.
Identifiers: *Hatteras Island(NC).

Rhythmic shoreline topography, termed shoreline meandering, was investigated along Hatteras Island, North Carolina, using aerial photography. Two types of meanders were distinguished on the basis of form geometry. The temporal and spatial variabilities of meandering were quantified using spectral and multivariate techniques. In a model of the beach cycle in the nearshore zone, the occurrence of small meanders is a function of storm-current velocity, nearshore slope, and a post-storm balance of onshore and offshore sand transport (due to the presence of topography-forced nearshore circulation). The model explains the observed characteristics of small, rhythmic meanders. Large meanders are explained as regions of severe storm erosion caused by wave convergence over long, offshore shoals. (Knapp-USGS)
W74-12643

PARTICLE SIZE DISTRIBUTION AND SMALL-SCALE BED-FORMS ON SAND WAVES, CHESAPEAKE BAY ENTRANCE,
Old Dominion Univ., Norfolk, Va. Inst. of Oceanography.
For primary bibliographic entry see Field 2L.
W74-12650

EROSION AND SEDIMENT YIELDS IN MOUNTAIN WATERSHEDS OF THE TRANSVERSE RANGES, VENTURA AND LOS ANGELES COUNTIES CALIFORNIA--ANALYSIS OF RATES AND PROCESSES,
Geological Survey, Menlo ark, Calif.
K. M. Scott, and R. P. Williams.
Water-Resources Investigations 47-73, June 1974. 66 p, 12 fig, 8 tab, 54 ref.

Descriptors: *Erosion, *Sediment yield, *California, *Mass wasting, Sedimentation, Alpine, Mountains, Geology, Geomorphology, Topography, Slopes.
Identifiers: *Transverse Ranges(Calif).

Erosion rates in mountain watersheds of the western Transverse Ranges of Ventura County, California, range from very low values to values as high as those recorded anywhere for comparable bedrock erodibilities. A major reason for this extreme variability is the high degree of tectonic activity in the area--watersheds are locally being uplifted by at least as much as 25 feet per 1,000 years. The maximum extrapolated rate of denudation is 7.5 feet per 1,000 years. Evidence of large amounts of uplift continuing into historic time includes structurally overturned strata of Pleistocene age, active thrust faulting, demonstrable stream antecedence, uplifted and deformed terraces, and other results of base-level change seen in stream channels. The importance in the area of debris flows, mudflows, and mass movements is also a reflection of the active tectonic setting of the Transverse Ranges. Lateral supply of sediment to stream channels is a relatively continuous process, accomplished during the dry season by dry sliding, in addition to wet-season contributions from overland flow and mass movements. During periods without major storms, stream channels undergo continuous fill. Then, during a storm of high recurrence interval, channel-bed material is mobilized and dispersed in large part by debris flows--coarse granular slurries, some of which are induced by mass movements triggered by the storm. Channels undergo substantial net scour, accomplished by removal of bed material in debris flows and by scour during recession flow. Valley-side slopes are undercut by bank erosion, and a new cycle of channel infilling by hillslope processes is initiated. (Knapp-USGS)
W74-12652

SAND GULLYING IN A SAHELIAN SITE: OBSERVATIONS DURING RECENT RAINFALL IN THE NOUAKCHOTT REGION (MAURITANIA),
Institut Fondamental d'Afrique Noire, Dakar (Senegal). Dept. of Geography.
For primary bibliographic entry see Field 4D.
W74-12677

THE LACK OF INORGANIC REMOVAL OF DISSOLVED SILICA DURING RIVER-OCEAN MIXING,
University of South Florida, St. Petersburg. Marine Science Inst.
For primary bibliographic entry see Field 5G.
W74-12724

OBSERVATIONS OF THE ORGANIC COMPONENTS OF THERMAL MUDS: III. THE LIPID FRACTIONS OF THE LACCO AMENO (ISCHIA) PELOIDS, (IN ITALIAN),
Rome Univ. (Italy). Istituto di Terapia Medica Sistematica e Idrologia Medica.
A. Rigoli, E. Fedeli, S. B. Curri, N. Cortesi, and G. Ricci.

Biochim Biol Sper. Vol 10, No 1, p 39-50. 1971/1972. Illus. (English summary).
Identifiers: *Chromatography, *Italy, Lipids, *Muds, *Thermal properties, Organic matter.

In follow-up investigations on the lipidic composition of muds of different Italian thermal baths, the acetone soluble lipid fraction and the total lipids extracted from a mud sample from Lacco Ameno (Ischia, Italy) after Folch's method were studied by thin layer and gas-liquid chromatography (GLC). They consisted of 32.9% phospholipids and pigments (carotenoids), 24.1% triglycerides, 12.1% di- and monoglycerides, 18% hydrocarbons C30-C38, 6.7% sterols, 4.4% free fatty acids and 1.8% alcohols and terpenes. The presence of cholesterol (20.5%), beta-sitosterol (30%), stigmasterol (15.3%), campesterol (7.5%) and an unknown sterol (26.7%) was verified. The triterpenic alcohols were alpha- and beta-amyrine (74.3%), cycloarthanol (15.8%) and 24-methylenecycloarthanol (9.9%). The maturation-technique carried out in Ischia was questioned.--Copyright 1973, Biological Abstracts, Inc.
W74-12739

2K. Chemical Processes

ECOLOGY AND ANALYSIS OF TRACE CONTAMINANTS - PROGRESS REPORT, JANUARY 1973-SEPTEMBER 1973.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12021

HYDROLYTIC BEHAVIOR OF TOXIC METALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12027

DEVELOPMENT OF HIGH SENSITIVITY X-RAY FLUORESCENCE FOR ANALYSES OF TRACE TOXIC ELEMENTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12028

ENVIRONMENTAL APPLICATIONS OF CENTRIFUGAL PHOTOMETRIC ANALYSIS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12029

SEPARATION, DETECTION, AND IDENTIFICATION OF ORGANICALLY BOUND TOXIC METALS AND OTHER HAZARDOUS MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12030

MEASUREMENT OF MOLECULAR ORGANIC CONTAMINANTS IN POLLUTED WATER BY LIQUID CHROMATOGRAPHY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12031

RAPID 15-N ISOTOPIC-RATIO ANALYTICAL SYSTEM FOR ENVIRONMENTAL SAMPLES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12032

WATER RESOURCES OF THE POWDER RIVER BASIN AND ADJACENT AREAS, NORTHEASTERN WYOMING,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12056

WATER QUALITY AND RELATED STUDIES, JACKSONVILLE AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-12077

SOLMNEQ: SOLUTION-MINERAL EQULIBRIUM COMPUTATIONS,
California Univ., Berkeley. Dept. of Geology and Geophysics.
Y. K. Kharaka, and I. Barnes.
Available from NTIS, Springfield, Va 22161 as PB-215 899 Price $3.00 printed copy; $2.25 microfiche. Geological Survey Computer Contribution (USGS-WRD-73-002), February 1973. 82 p, 2 tab, 51 ref, 5 append. USGS Grant 14-08-0001G-45.

Descriptors: *Computer programs, *Water chemistry, *Equilibrium, *Mineraology, Solubility, Water analysis, Chemical analysis, Water temperature, Hydrogen ion concentration, Oxidation-reduction potential, Thermodynamics, Ions, Aqueous solutions.

A computer program (SOLMNEQ) computes the equilibrium distribution of 162 inorganic aqueous species generally present in natural waters over the temperature range of 0 deg to 350 deg C from reported chemical analyses, temperature, pH, and Eh. Interpolated dissociation constants of the aqueous complexes and computed activity coefficients are also used in these computations. States of reactions of aqueous solutions with respect to 158 solid phases (minerals) are computed from the distribution of aqueous species and an internally consistent set of thermodynamic data. Ionic proportions and subsurface temperature estimates are also computed. The program is written in PL/I for the IBM 360 computer. (Knapp-USGS)
W74-12086

PHOTOIONIZATION OF PHENOLS IN WATER: EFFECTS OF LIGHT INTENSITY, OXYGEN, PH, AND TEMPERATURE,
Hebrew Univ., Jerusalem (Israel). Dept. of Physical Chemistry.
For primary bibliographic entry see Field 5B.
W74-12169

DETERMINATION OF TRACE METAL POLLUTANTS IN WATER RESOURCES AND STREAM SEDIMENTS,
Dayton Univ., Ohio.
For primary bibliographic entry see Field 5A.
W74-12194

PROCEEDINGS, SYMPOSIUM ON CONTROL OF FINE PARTICULATE EMISSIONS FROM INDUSTRIAL SOURCES.
For primary bibliographic entry see Field 5A.
W74-12208

COMPARISON OF GERMANIUM DETECTORS FOR NEUTRON ACTIVATION ANALYSIS FOR MERCURY,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W74-12220

AN IMPROVED METHYLTHYMOL BLUE PROCEDURE FOR AUTOMATED SULFATE DETERMINATION,
Georgia Univ., Athens. Inst. of Ecology.
R. J. Watrous, and J. E. Douglass.
Analytical Chemistry, Vol 46, No 9, p 1329-1331, August, 1974. 2 fig, 2 ref. *Interagency Agreement AG-199, 40-193-69.

Descriptors: *Sulfates, *Water analysis, Chemical analysis, *Water chemistry, Runoff, Chemistry of precipitation.

Former methods of determining sulfate in streamflow and precipitation on the AutoAnalyzer II were typically noisy and plagued with shifting baselines. The new method proved accurate, easy to maintain in operation, and sensitive to concentrations in the 0-10 mg/1 range. The increased sensitivity was achieved by using a 50-mm flow cell, maintaining a higher flow rate to the colorimeter by the addition of ethanol to the sample stream, and maintaining a low flow cell extraction rate. Detection limits for the procedure were better than 0.020 mg/1, and the percentage accuracy in the 0-1.0 mg/1 range was 1.7 percent error.
W74-12228

FINE STRUCTURE OF LIGHT ATTENUATION AND ITS RELATION TO TEMPERATURE IN THE IRISH SEA,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
D. C. Heathershaw, and J. H. Simpson.
Estuarine and Coastal Marine Science, Vol 2, No 2, p 91-103, 1974. 9 fig, 12 ref.

Descriptors: *Sea water, *Salinity, *Optical properties, *Thermal stratification, On-site tests, Light intensity, Aquatic environment, Light, Evaluation, Attenuation, Temperature, Thermocline, Water properties.
Identifiers: *Irish Sea, Transmittance gradient.

Detailed observations of optical beam transmittance were made in a stratified region of the Irish Sea. The distribution of transmittance was found to be strongly influenced by the temperature structure, significant gradients of both parameters frequently occurring together. Strong minima in transmittance with a horizontal length scale of kilometres were observed in the thermocline. A steady state vertical diffusion model was applied to the data below the thermocline, giving values of the eddy coefficient in this region of 1-6 sq cm. (Humphreys-ISWS)
W74-12279

THE ROLE OF OXYGEN IN NITROGEN LOSS FROM FLOODED SOILS,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 2G.
W74-12290

DETERMINATION OF DISPERSION AND NONLINEAR ADSORPTION PARAMETERS FOR FLOW IN POROUS MEDIA,
Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
For primary bibliographic entry see Field 2G.
W74-12299

EXPERIMENTAL EVALUATION OF CHEMICAL TRANSPORT IN WATER-SATURATED POROUS MEDIA: 1. NONSORBING MEDIA,
Oregon State Univ., Corvallis. Dept. of Soil Science.; and Oregon State Univ., Corvallis. Dept. of Agricultural Chemistry.
For primary bibliographic entry see Field 2G.
W74-12306

SORPTION OF ORTHOPHOSPHATE ON THE SURFACE OF WATER SAMPLE CONTAINERS,
Agricultural Research Service, Morris, Minn.
For primary bibliographic entry see Field 5A.
W74-12307

THE ABSORPTION OF LOW CONCENTRATIONS OF SULPHUR DIOXIDE INTO AQUEOUS SOLUTIONS,
Auckland Univ. (New Zealand). Dept. of Chemistry.

For primary bibliographic entry see Field 5B.
W74-12311

THE SOLUBILITY OF VERY LOW CONCENTRATIONS OF CARBON MONOXIDE IN AQUEOUS SOLUTION,
Auckland Univ. (New Zealand). Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W74-12316

ON THE ABSORPTION OF SO2 IN OCEAN WATER,
Frankfurt Univ. (West Germany). Institut fuer Meteorologie und Geophysik.
S. Beilke, and D. Lamb.
Tellus, Vol 26, No 1-2, p 268-271, 1974. 4 fig, 6 ref.

Descriptors: *Absorption, *Sulfur compounds, *Gases, *Ocean water, *Sorption, Oxides, Hydrogen sulfide, Sea water, Chemical properties, Sulfur, Solubility, Water analysis, Analytical techniques, Sulfates, Sulfides, Inorganic compounds, Sinks.
Identifiers: Sulfur dioxide, Desorption, Bubble column experiments, Source, Buffer capacity, Liquid phase, Gas phase, Atmospheric sulfur budget, Terrestrial sulfur budget.

The role which the ocean plays with respect to the atmospheric sulfur budget is unclear. It is known that the ocean is an important source of sulfate-containing particles, but opinions differ on the question: Is the ocean a sink or a source of SO2 and H2S. On the basis of laboratory investigations, the absorption and desorption of SO2 by sea water was discussed. The results of measurements show that the ocean is an SO2 sink and presumably cannot be a direct SO2 source. The possibility of an indirect source of SO2 was considered in a discussion of current literature on H2S-oxidation in ocean water. (Henley-ISWS)
W74-12320

WATER RESOURCES OF WISCONSIN, LAKE SUPERIOR BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12335

WATER RESOURCES OF WISCONSIN-MENOMINEE-OCONTO-PESHTIGO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12336

EFFECTS OF CLEAR CUTTING ON WATER DISCHARGE AND NUTRIENT LOSS, BITTERROOT NATIONAL FOREST, MONTANA,
Montana Univ., Missoula. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-12359

EXPEDITION 'ODYSSEUS 65': RADIOCARBON AGE OF BLACK SEA DEEP WATER,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 2E.
W74-12374

EVOLUTION OF ANOXIC CONDITIONS IN BLACK SEA DURING HOLOCENE,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-12375

DISTRIBUTION OF SOME TRACE ELEMENTS IN BLACK SEA AND THEIR FLUX BETWEEN DISSOLVED AND PARTICULATE PHASES,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5B.
W74-12376

PHOSPHORUS IN BLACK SEA,
Fishery Board of Sweden, Gotenburg. Hydrographic Dept.
For primary bibliographic entry see Field 5B.
W74-12377

RELATION BETWEEN CHLORINITY AND CONDUCTOMETRIC SALINITY IN BLACK SEA WATER,
Kiel Univ. (West Germany). Institut fuer Meereskunde.
K. Kremling.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A. , EDITORS: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 151-154, 1974. 2 fig, 2 tab, 10 ref.

Descriptors: *Water chemistry, *Sea water, *Salinity, *Conductivity, Chlorides, Sulfates, Boron, Fluorides, Calcium, Density stratification.
Identifiers: *Black Sea, Chlorinity.

The chlorinity and conductometric salinity were determined for Black Sea water collected from 14 stations. A regression line compares the differences between conductometric and titrimetric salinities. The determination of chlorinity from conductometric salinity is only possible to 0.01 percent (at a 70-percent confidence limit), because of the ionic variation of Black Sea water. The chlorinity ratios of sulfate, boron, fluoride, and calcium from water at station 1486 are presented. (Knapp-USGS)
W74-12378

INTERSTITIAL WATERS OF BLACK SEA SEDIMENTS: NEW DATA AND REVIEW,
Geological Survey, Woods Hole, Mass.
F. T. Manheim, and K. M. Chan.
In: The Black-Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 155-180, 1974. 13 fig, 12 tab, 86 ref.

Descriptors: *Pore water, *Bottom sediments, *Salinity, *Water chemistry, Chlorides, Sea water, Brines, Alkalinity, Sulfates, Sulfides, Density stratification.
Identifiers: *Black Sea.

The composition of pore fluids trapped in the bottom sediments of the Black Sea provides information of geochemical and paleohydrologic aspects of the Black Sea during the Holocene and late Pleistocene Epochs. Most piston cores show a decrease in interstitial chlorinity and salinity with depth. This suggests that during isolation of the Black Sea in the last glacial maximum (Neoeuxinian), the Black Sea had a relatively homogeneous chlorinity of about 3.5 g/kg, compared with more than 12 g/kg in present bottom water. Submarine discharge of fresh to brackish groundwaters occurs in several areas. In addition, a saltier subsediment input near the Bosporus channel is possibly a result of upward diffusion of salts from evaporites or continental brines. Diagenetic reactions between pore fluids and sediments result in (1) strong uptake of interstitial potassium and magnesium in nonexchangeable positions in the sediments and (2) loss of sulfate by bacterial reduction. Calcium, bicarbonate alkalinity, decreases with depth in cores, suggesting that both carbonate precipitation and dissolution occur in the deeper sediments. Interstitial waters are the main source of iron, manganese, and phosphorus for iron-manganese concretions on the oxygenated Crimean shelf. Supply from this source corresponds to a growth rate of 5 mm/1,000 years. (Knapp-USGS)
W74-12379

RECENT SEDIMENTS OF BLACK SEA,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 2J.
W74-12380

GEOCHEMISTRY OF SEDIMENTS FROM ELEVEN BLACK SEA CORES,
Durham Univ. (England). Dept. of Geochemistry.
For primary bibliographic entry see Field 2J.
W74-12387

INFLUENCE OF ORGANIC MATERIAL AND PROCESSES OF SULFIDE FORMATION ON DISTRIBUTION OF SOME TRACE ELEMENTS IN DEEP-WATER SEDIMENTS OF BLACK SEA,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
I. I. Volkov, and L. S. Fomina.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E. T., and Ross, D. A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 456-476, 1974. 5 fig, 6 tab, 61 ref.

Descriptors: *Geochemistry, *Sulfides, *Trace elements, *Organic matter, Dissolved oxygen, Sorption, Mud, Pyrite, Chemical precipitation, Water chemistry, Molybdenum, Cobalt, Nickel, Copper.
Identifiers: *Black Sea, Sapropels.

The irregular distribution of elements in Black Sea deposits is explained by the geochemical evolution of the basin in postglacial times and is controlled by several factors. Chief among these factors are the change in hydrodynamic regime and the decreasing rate of sedimentation in post-Neoeuxinian time. Subsidiary factors, beginning during Old Black Sea time, include the increasing proportion of organic matter in the sediments; the appearance and stabilization of H2S in bottom water; and the initiation of the Bosporus underflow, which brought Mediterranean water into the Black Sea. Maximum concentrations of Mo, V, Co, Ni, and Cu are found in the sapropelic muds of the Old Black Sea deposits. Cobalt concentrations correlate with sulfide (represented basically by pyrite). Higher concentrations of microelements in the sapropels result from absorption of metals from seawater by organic detritus during settling of the particulates. Accumulation of metals by living planktonic organisms is subordinate. Mo, Co, Ni, and Cu in pyrite from deep-water sediments of the H2S zone were significantly enriched. (Knapp-USGS)
W74-12388

ORGANIC ANALYSES OF BLACK SEA CORES,
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 2J.
W74-12389

FORMS OF IRON IN SURFACE LAYER OF BLACK SEA SEDIMENTS,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-12390

BEHAVIOR OF MOLYBDENUM IN PROCESSES OF SEDIMENT FORMATION AND DIAGENESIS IN BLACK SEA,
Akademiya Nauk SSSR, Gelendzhik. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-12391

ISOTOPIC AND ELEMENTAL GEOCHEMISTRY OF BLACK SEA SEDIMENTS,
Bureau of Mineral Resources, Canberra (Australia).
For primary bibliographic entry see Field 2J.

W74-12392

ATOMIC ABSORPTION DETERMINATION OF NANOGRAM QUANTITIES OF ARSENIC IN BIOLOGICAL MEDIA,
Washington Univ., Seattle. Dept. of Environmental Health.
For primary bibliographic entry see Field 5A.
W74-12479

ANALYSIS OF BACKGROUND COPPER CONCENTRATION IN SEAWATER BY ELECTRON SPIN RESONANCE,
Kansas State Highway Commission, Topeka. Planning and Development Dept.
For primary bibliographic entry see Field 5A.
W74-12482

DETERMINATION OF ZINC AND NICKEL BY CHARGED PARTICLE ACTIVATION ANALYSIS,
Texas A and M Univ., College Station. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-12484

DETERMINATION OF MERCURY AND SELENIUM IN COAL BY NEUTRON ACTIVATION ANALYSIS,
North Carolina State Univ., Raleigh. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5A.
W74-12485

RESPONSE OF CYANIDE ION SELECTIVE MEMBRANE ELECTRODES IN THE PRESENCE OF METAL IONS,
Rome Univ., (Italy). Instituto di Chemica Analitica.
For primary bibliographic entry see Field 5A.
W74-12489

X-RAY PHOTOELECTRON SPECTRA OF LEAD OXIDES,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-12498

ELECTRON SPECTROSCOPY (ESCA): USE FOR TRACE ANALYSIS,
Georgia Univ., Athens. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-12499

DETERMINATION OF SOLUBLE CADMIUM, LEAD, SILVER, AND INDIUM IN RAINWATER AND STREAM WATER WITH THE USE OF FLAMELESS ATOMIC ABSORPTION,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5A.
W74-12501

LOSSES OF TRACE CONCENTRATIONS OF CADMIUM FROM AQUEOUS SOLUTION DURING STORAGE IN GLASS CONTAINERS,
Idaho Univ., Moscow. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-12502

ARGILLIZATION BY DESCENDING ACID AT STEAMBOAT SPRINGS, NEVADA,
Geological Survey, Washington, D.C.
R. Schoen, D. E. White, and J. J. Hemley.
Clays and Clay Minerals, Vol 22, p 1-22, 1974. 11 fig, 6 tab, 49 ref.

Descriptors: *Water chemistry, *Hot springs, *Acids, Sulfides, Sulfates, Acidic water, Clay minerals, *Nevada, Mineralogy, Hydrogen ion concentration, Hydrothermal studies.
Identifiers: *Steamboat Springs(Nev).

Steamboat Springs, Nevada, an area of present-day hot springs, clearly illustrates the genetic dependence of some kaolin deposits on hot-spring activity. Andesite, granodiorite and arkosic sediments are locally altered at the land surface to siliceous residues consisting of primary quartz and anatase, plus opal from primary silicates. These siliceous residues commonly exhibit the textural and structural features of their unaltered equivalents. Beneath the siliceous residues, kaolin and alunite replace primary silicates and fill open spaces, forming a blanketlike deposit. Beneath the kaolin-alunite zone, montmorillonite, commonly accompanied by pyrite, replaces the primary silicates. On the ground surface, the same alteration mineral zones can be traced outward from the siliceous residue; however, hematite rather than pyrite accompanies montmorillonite. Sulfuric acid is the active altering agent. The acid forms from hydrogen sulfide that exsolves from deep thermal water, rises above the water table and is oxidized by sulfur-oxidizing bacteria living near the ground surface. This acid dissolves and percolates downward, destroying most of the primary minerals to produce a siliceous residue. Coincidence of the water table with the downward transition from siliceous residue to kaolin-alunite signifies decreasing hydrogen metasomatism because of dilution of acid by groundwater. (Knapp-USGS)
W74-12651

CLAY WATER INTERACTIONS--AN EXPERIMENTAL STUDY OF INTERFACE PHENOMENA,
Royal Inst. of Tech., Stockholm (Sweden). Nuclear Magnetic Resonance Group.
For primary bibliographic entry see Field 2G.
W74-12654

AUTOMATED GAS CHROMATOGRAPHIC ANALYSIS OF SULFUR POLLUTANTS,
Varian Aerography, Walnut Creek, Calif.
For primary bibliographic entry see Field 5A.
W74-12690

APPLICATION OF THE FISSION-TRACK TECHNIQUE TO THE DETERMINATION OF URANIUM IN NATURAL WATERS,
Kyushu Univ., Fukuoka (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-12720

HYDROBIOLOGICAL INVESTIGATIONS IN THE DANUBE SECTION ENCLOSED BETWEEN THE 1965 AND 1956 RIVER KM (NAGYMAROS-MEGYER SECTION) (DANUBIALIA HUNGARICA LVII),
A. Bothar, Z. T. Dvihally, and E. V. Kozma.
Ann Univ Sci Budap Rolando Eotvos Nominatae Sec Biol. 13, p 3-18, 1971. Illus.
Identifiers: Alona, Cladocera, Copepods, *Danube River, *Hungary, Iliocryptus, *Algae, Water chemistry, *Plankton, Monospilus.

Year-round zoological and hydrochemical investigations of a selected section of the Danube River revealed no significant differences between the end points of the section studied, and no noteworthy changes in the dissolved salt content and in the pollution level of the water as compared to investigations conducted in previous years. The minor changes observed in the chemical properties of the water were due to variations in hydrological conditions, and in the assimilation activity of algae. Studies of the planktons of this river section revealed 20 Cladocera sp. and 7 Copepoda sp., of which 3 species (Alona guttata, Iliocryptus agilis, and Monospilus dispar) are new for the Hungarian section of the Danube.--Copyright 1973, Biological Abstracts, Inc.
W74-12731

DECOMPOSITION OF NITROGEN COMPOUNDS IN LAKE MUD IN VIEW OF NITROGEN ISOTOPE RATIOS: I. ANALYTICAL METHOD FOR NITROGEN COMPOUNDS IN SEDIMENTS,
Yokohama Sewerage Bureau, Kanagawa (Japan).
K. Sakata, and S. Matsuo.
Geochem J. Vol 6, No 2, p 49-58. 1972. Illus.
Identifiers: *Mud, *Nitrogen, *Lake sediments, *Isotopes, Lakes.

The method of chemical separation for N compounds in soils established by Bremner was checked and modified to apply for the measurement of the natural variation in isotopic ratios of N compounds in sediments. Separation of N compounds in different occurrences (i.e., in interstitial water, in the exchangeable site on the surface of solid, and in solid) was also studied, and the optimum conditions for the separation were determined.--Copyright 1973, Biological Abstracts, Inc.
W74-12733

OBSERVATIONS OF THE ORGANIC COMPONENTS OF THERMAL MUDS: III. THE LIPID FRACTIONS OF THE LACCO AMENO (ISCHIA) PELOIDS, (IN ITALIAN),
Rome Univ. (Italy). Istituto di Terapia Medica Sistematica e Idrologia Medica.
For primary bibliographic entry see Field 2J.
W74-12739

2L. Estuaries

SURFACE-WATER INVESTIGATIONS ON THE LUMMI INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4A.
W74-12008

A NUMERICAL MODEL OF MATERIAL TRANSPORT IN SALT-WEDGE ESTUARIES, PARTS I AND II,
Geological Survey, Tacoma, Wash.
H. B. Fischer, J. D. Stoner, W. L. Haushild, and J. B. McConnell.
Open-file report, 1974. 63 p, 22 fig, 3 tab, 22 ref.

Descriptors: *Stratified flow, *Estuaries, *Saline water intrusion, *Mathematical models, *Computer programs, Washington, Mixing, Path of pollutants, Tides, Currents(Water), Saline water-freshwater interfaces.
Identifiers: *Duwamish River(Wash).

A mathematical model calculates flow in estuaries. Water in a salt-wedge estuary is characterized by an oscillating well-mixed wedge of undiluted ocean-derived water topped by a series of successively more dilute overlying layers. In the wedge the flow is back and forth, with a net landward component to replace water entrained upward into the overlying layer; in the overlying layers the flow also oscillates, but with a net seaward component because of the input of fresh river water and entrained wedge water. The flow is modeled and used as an input to the constituent-transport model. The computer program then is used to determine the advection and dispersion of dissolved constituents and plankton, and their concentrations throughout the system in response to given inputs. Saltwater from Elliott Bay on Puget Sound, Washington, forms a wedge in the lower part of the Duwamish River estuary. The numerical model was used in computing salinity distributions in the estuary and oxygen-use rates and dissolved-oxygen distributions in the salt wedge. Computed spatial distributions of salinity agreed

well with observed distributions during about 30 slack tides in July and August 1968. Analyses of the sensitivity of computed salinity to changes in model input parameters indicate that it changed most in response to changes in the wedge salinity and the location of the wedge toe. (Knapp-USGS)
W74-12057

NUMERICAL MODEL STUDIES OF RIVERS AND ESTUARIES,
National Research Council of Canada, Ottawa (Ontario). Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-12101

CONTROL OF SEA WATER INTRUSION BY SALTWATER PUMPING--A MATHEMATICAL MODEL,
MacLaren (James F.) Willowdale (Ontario).
For primary bibliographic entry see Field 5G.
W74-12102

FORECASTING POLLUTION IN RIVERS, ESTUARIES AND THE SEA,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5B.
W74-12116

COASTAL MARINE POLLUTION AND FISH,
Fisheries Research Board of Canada, West Vancouver, B.C. Pacific Environmental Inst.
For primary bibliographic entry see Field 5C.
W74-12252

AMMONIA EXCRETION BY ZOOPLANKTON AND ITS SIGNIFICANCE TO PRIMARY PRODUCTIVITY DURING SUMMER,
Univ. of Washington, Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W74-12253

STUDIES ON COPPER, IRON, MANGANESE AND ZINC IN OYSTERS (CRASSOSTREA ANGULATA) ON THE GULF OF CADIZ (ESTUDIOS DEL COBRE, HIERRO, MANGANESO Y CINC EN OSTIONES-CRASSOSTREA ANGULATA-DEL GOLFO DE CADIZ),
Instituto de Investigaciones Pesqueras, Cadiz (Spain).
For primary bibliographic entry see Field 5C.
W74-12256

THE COMMON MUSSEL MYTILUS EDULIS AS INDICATOR FOR THE LEAD CONCENTRATION IN THE WESER ESTUARY AND THE GERMAN BIGHT, (DIE MIESMUSCHEL MYTILUS EDULIS ALS INDIKATOR FUR DIE BLEIKONZENTRATION IM WESERASTUAR UND IN DER DEUTSCHEN BUCHT),
Institut fuer Meeresforschung, Bremerhaven (West Germany).
For primary bibliographic entry see Field 5B.
W74-12265

MODULARIZED SYSTEMS FOR FIELD ANALYSIS OF PRIMARY PRODUCTION IN CHESAPEAKE BAY,
Academy of Natural Sciences of Philadelphia, Benedict, Md. Benedict Estuarine Lab.
For primary bibliographic entry see Field 5A.
W74-12268

FINE STRUCTURE OF LIGHT ATTENUATION AND ITS RELATION TO TEMPERATURE IN THE IRISH SEA,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 2K.
W74-12279

METAL DISTRIBUTION ALONG A PROFILE OF AN INTER-TIDAL AREA,
Stockholm Univ. (Sweden). Geological Inst.
For primary bibliographic entry see Field 5B.
W74-12280

LITHOFACIES RELATIONS IN THE LATE QUATERNARY NIGER DELTA COMPLEX,
Koninklijke Shell Exploratie en Produktie Laboratorium, Rijswijk (Netherlands).
E. Oomkens.
Sedimentology, Vol 21, No 2, p 195-222, May 1974. 18 fig, 27 ref.

Descriptors: *Deltas, *Quaternary period, *Deposition(Sediments), *Africa, Geomorphology, Coasts, Rivers, Sedimentology, Cores, Boreholes, Evaluation, Stratigraphy, Recent epoch, Marine geology, Investigations.
Identifiers: *Niger River delta, Gulf of Guinea, Coastal deposits, *Lithofacies.

A study of cores from thirty-three coreholes drilled in various parts of the Niger delta has shown tidal channel sand to be the dominant lithofacies type in the uppermost 30 m of the deltaic complex. Below 30 m fluviatile sand becomes predominant. Coastal barrier sand is present in the uppermost 5 m of the present coastal belt, but chances for preservation of this lithofacies appear to be small. The Post-Glacial deltaic sediments can be divided into three units. (1) Alluvial valley-fill sands and conglomerates deposited during the strong Post-Glacial sea level rise. (2) An onlapping complex of lower coastal plain deposits which contains a lower member of fine grained lagoonal and mangrove swamp deposits and an upper member of tidal channel and coastal barrier sands. This complex is thought to have been deposited during the strong Post-Glacial rise in sea level and is locally as much as 25 m thick. (3) An offlapping complex of fluviomarine and coastal deposits which contains a lower member of marine clay and silt and an upper member of tidal channel and coastal barrier sand. The presence of this late Holocene complex indicates that deltaic progradation was resumed as soon as the rapid rise in sea level slowed down. The offlapping complex is locally as much as 35 m thick. (Humphreys-ISWS)
W74-12305

WATER CIRCULATION AND NUTRIENTS IN THE NORTH-WEST IRISH SEA,
Liverpool Univ. (England). Dept. of Marine Biology.
D. J. Slinn.
Estuarine and Coastal Marine Science, Vol 2, No 1, p 1-25, January 1974. 12 fig, 40 ref.

Descriptors: *Ocean circulation, *Sea water, *On-site investigations, *Water quality, Water properties, Thermal stratification, Turnovers, Oceans, Stratification, Thermocline, Salinity, Evaluation, Nutrients, Nitrates, Nitrites, Silicates, Phosphates, Dissolved oxygen, Distribution patterns, Profiles, Hydrologic data, Surveys, Bathythermographs, Chlorophyll.
Identifiers: *United Kingdom(Isle of Man), *Irish Sea, Hydrographic observations.

Results of hydrographic observations made in the Irish Sea to the west of the Isle of Man during 1954-1961 and 1965-1968 were presented and discussed. There was evidence that Atlantic water, although considerably diluted by fresh water runoff, penetrates southwards off the Irish coast. Winter hydrographic conditions tended to exhibit vertical uniformity, but bottom water of higher salinity which was also distinguishable by small temperature differences was sometimes present. During summer, surface warming brought about marked temperature layering which persisted and consolidated in the region characterized by weak tidal currents. Associated with the temperature layering was a well defined pattern of nutrient, dissolved oxygen, and chlorophyll alp distribution. Nitrate virtually dissappeared during the summer and would thus seem to be the limiting nutrient. Coinciding with autumn was a rise in oxygen saturation in nutrients. The highest chlorophyll alpha concentrations, however, tended not to coincide with the highest oxygen saturations. In the deep bottom water of the trough, nutrient concentrations remain high and oxygen saturations low, suggesting that this is due to regenerative processes. Following the breakdown of temperature layering, the autumnal overturn distributes nutrients evenly throughout the water column. Nitrite can be particularly high at this time but declined rapidly as nitrate and other nutrients increased. (Humphreys-ISWS)
W74-12322

A SUBSURFACE RIBBON OF COOL WATER OVER THE CONTINENTAL SHELF OFF OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 2E.
W74-12324

LAGRANGIAN MEASUREMENTS IN A COASTAL UPWELLING ZONE OFF OREGON,
Inter-American Tropical Tuna Commission, La Jolla, Calif.
For primary bibliographic entry see Field 2E.
W74-12325

POTENTIAL OF GEOPHYSICAL METHODS FOR STUDYING FRESH-WATER DISCHARGES IN THE COASTAL ZONES OF SEAS,
V. A. Bogoslavskiy, and A. A. Ogil'vi.
Soviet Hydrology: Selected Papers, No 1, p 51-57, 1973. 2 fig, 1 tab, 4 ref. Translated from Vodnyye Resursy, No 1, p 178-185, 1973.

Descriptors: *On-site data collections, *Coasts, *Subsurface mapping, *Instrumentation, Evaluation, Exploration, On-site investigations, Basic data collections, Electrical studies, Resistivity, Shores, Oceans, Geophysics, Hydrogeology, Sediment distribution, Discharge(Water), Electronic equipment, Profiles.
Identifiers: *USSR(Odessa region), *Abkhaz ASSR(Gantiadi), Geophysical methods, Black Sea, Caspian Sea.

Areal distribution of bottom sediments and mapping of submarine sources were determined by resistivity measurements and temperature profiling. Data compiled for the Black and Caspian Seas were tabulated for the resistivity of rocks on the sea floor as a function of their density and lithological composition. Electrical prospecting added to the information obtained by drilling on the geological section. Thermometric and electrometric measurements permitted fairly effective mapping of submarine sources and study of their discharge conditions. (Humphreys-ISWS)
W74-12329

MEASUREMENTS OF SAND TRANSPORT BY WIND ON A NATURAL BEACH,
J. N. Svasek, and J. H. J. Terwindt.
Sedimentology, Vol 21, p 311-322, 1974. 8 fig, 10 ref.

Descriptors: *Beaches, *Velocity, *Saltation, *Sediment transport, *Shear stress, *Wind velocity, Sands, Tractive forces, Coastal engineering, Hydraulics, Sedimentology, Moisture content.
Identifiers: *Shear stress velocity, *Critical shear stress velocity, Velocity distribution.

Bagnold's and Kawamura's formula may be used for the calculation of the sand movement on a

natural beach provided the shear stress velocity is greater than 0.4 m/s. Great discrepancies were found between calculated and measured sand transport rates for sheer stress velocity less than 0.4 m/s mainly because of the capillary forces acting on a wet beach. The measured critical shear velocity at the beginning of sand movement on a clean dry beach agrees very well with that predicted by Bagnold's formula. On a dry beach where the sand grains are stuck together, critical shear velocity was found to be about 10% higher. On a wet beach, initial sheer velocity appeared to depend on the moisture content of the surface layer. Grain size is a determining parameter in the critical sheer velocity moisture content relation. When the angle between the wind direction at sea and the dune face is between 15 degrees and 85 degrees the streamlines of the wind will bend in the vicinity of the dune face. In consequence this may influence the direction of sediment movement. (Yang-ISWS)
W74-12334

ATLANTIC CONTINENTAL SHELF AND SLOPE OF THE UNITED STATES--SEDIMENT TEXTURE OF THE NORTHEASTERN PART,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2J.
W74-12337

THE POTENTIAL OF METEOROLOGICAL SATELLITE CLOUD OBSERVATIONS FOR DELINEATION OF SIGNIFICANT FEATURES OF COASTAL UPWELLING OFF OREGON,
Earth Satellite Corp., Washington, D.C.
For primary bibliographic entry see Field 7B.
W74-12338

COASTAL - ESTUARINE AND NEARSHORE PROCESSES, AN ANNOTATED BIBLIOGRAPHY,
Ocean Engineering Informaton Service, La Jolla, Calif.
E. Sinha, and B. McCosh.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 006, $6.00 in paper copy, $2.25 in microfiche. Water Resources Scientific Information Center, Washington, D.C. Report WRSIC 74-207, June 1974. 230 p, 1009 ref. OWRT W-169(1). 14-31-0001-9090.

Descriptors: *Bibliographies, *Estuaries, *Coasts, *Path of pollutants, Sedimentation, Sediment transport, Erosion, Beach erosion, Diffusion, Dispersion, Mixing, Salinity, Winds, Waves(Water), Tidal effects, Geomorphology, Geology, Meteorology, Oceanography.
Identifiers: *Nearshore, *Coastal waters, Flushing, Wave action, Wind effects.

A total 1009 annotated references to the literature on Coastal - Estuarine and Nearshore Processes is presented. The order of presentation is alphabetical by name of first author. A subject outline identifies the geologic, geomorphic, meteorologic and oceanographic references which deal with the highly variable interactions in the estuarine and in the nearshore zone. River discharge is an additional retrieval heading. Included in the subject outline is the identification of references on models, methods, and instruments used in the study of coastal processes. References to studies in various parts of the world are specified in the geographic outline. The list of bibliographies includes references to true bibliographies as well as to documents which contain 50 or more substantive references. An author index is included. The subject index, using descriptors and identifiers, provides rapid access to abstracts dealing with specific subject matter. Closing date for review of the literature for this bibliography was June 15, 1973.
W74-12351

SOCIO-ECONOMIC IMPACT OF ESTUARINE THERMAL POLLUTION,
MetroStudy Corp., Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-12353

THE BOSPORUS,
Stanford Research Inst., Irvine, Calif.
C. G. Gunnerson, and E. Ozturgut.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 99-114, 1974. 14 fig, 23 ref.

Descriptors: *Straits, *Water circulation, *Sea water, Currents(Water), Channel morphology, Oceanography, Salinity, Density stratification.
Identifiers: *Bosporus, *Black Sea.

The Bosporus is a strait 31 km long, whose bathymetry suggests the occurrence of past floodflows. Small semidiurnal and fortnightly tides often are obsecured by wind effects which occassionally reverse the southerly surface flow from the Black Sea. At depth, northflowing Mediterranean water maintains the surface salinity of the Black Sea at about 1.75%. The location, thickness, and slope of the boundary layer vary according to the bathymetry, season, and winds. (Knapp-USGS)
W74-12372

ROLE OF THE BOSPORUS IN BLACK SEA CHEMISTRY AND SEDIMENTATION,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
R. Scholten.
In: The Black-Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 115-126, 1974. 7 fig, 29 ref.

Descriptors: *Water chemistry, *Sedimentation, *Straits, Estuaries, Water circulation, Salinity, Stratification, Stratified flow, Sea water, Density stratification.
Identifiers: *Bosporus, *Black Sea.

Because the Bosporus is the only connection between the fresh to brackish Black Sea and the saline Mediterranean Sea (via the Sea of Marmara and the Dardanelles), it has played a critical role in controlling fluctuations in salinity, oxygen content, sedimentation, sea level, and life in the Black Sea. The original Bosporus valley apparently was cut by a south-flowing river which continued through the Dardanelles and was partly controlled by north-south faults. Upon drowning, the valley became a marine strait, although at times of glacial lowering of sea level it acted as a marine spillway or resumed its subaerial-valley condition with a central drainage divide. Its bedrock channel is at least 100 m below present sea level. The interface between the northward, saline bottom current and the southward, freshwater surface current slopes northward at an angle which is a function of the two densities and the hydraulic head. When sea level in only moderately high, the interface touches bottom south of the northern exist, and the saline bottom water is returned southward by the surface current. Only when sea level is higher than today can large quantities of Mediterranean water enter the Black Sea and bring salt and oxygen to the deep Black Sea bottom. (Knapp-USGS)
W74-12373

EVOLUTION OF SOME MARSHES OF EASTERN PRISAYANYE, (IN RUSSIAN),
Irkutskii Gosudarstvennyi Universiteit (USSR). Dept. of Botany.
I. G. Lyakhova.
Biol Nauki. Vol 16, No 3, p 70-74. 1973.

Identifiers: *Marshes, Peat, *USSR(Eastern Prisayanye).

An analysis was made of contemporary plant life and stratification of peat deposits of marshes of the East Prisayanye (USSR). The considerable marsh character of the land is due to the low relief of the region, abundant flooding and the widely distributed neotectonic movements. The migration of river beds favors the predominant development of low marshes and retards their evolution to a lower level.--Copyright 1973, Biological Abstracts, Inc.
W74-12510

SEASONAL ASPECTS OF THE FIXATION OF BENTHIC EPIFAUNA OF THE INFRATITTORAL LEVEL IN THE ESTUARY OF THE SAINT LAWRENCE RIVER,
University Coll. of North Wales, Bangor. Marine Science Labs.
E. Bourget.
J Fish Res Board Can. Vol 30, No 7, p 867-880, 1973. Illus. English summary.
Identifiers: Abundance, Balanus sp., *Benthos, *Canada, Estuaries, Fauna, Polydora, *St-Lawrence River.

For 2 seasons (May-Oct. 1969, 1970) the dynamic aspects of the settlement of benthic epifauna on hard substrata were studied. The stations were distributed on a 200-km distance, the salinity gradient ranging from 15-27%. Although over 60 spp. were identified on the plates, the analysis shows that only 3 of these are abundant: Polydora ciliata, Balanus balanoides, and B. crenatus. In general, the settlement period of the species is very short and most of the settling processes are concentrated in June, July, and Aug. The populations reached a peak of abundance during settlement and decreased regularly afterwards. This decrease is due mainly to intraspecific and interspecific competition for space, accumulation of sediment and hydrodynamic factors in autumn. The marked physical seasonality of this subarctic environment, more than true biotic succession, is reflected in the development of the community; during the summer, the community is biologically accommodated whereas in autumn and winter it is physically controlled.--Copyright 1973, Biological Abstracts, Inc.
W74-12521

MARITIME SANDS,
B. Pettersson.
Acta Phytogeographica Suecica, Vol 50, p 105-110, 1965. 3 fig, 16 ref.

Descriptors: *Beaches, *Sands, *Vegetation, Shores, Lichens, Grasses, Pine trees, Fungi, Coasts, Dunes.
Identifiers: *Maritime sands, Sweden, Baltic Sea coasts, Bryophytes, Calciocolous therophytes.

Knowledge of the sand vegetation of Swedish shores is fragmentary. The part of the beach washed by waves is called foreshore and is rather flat or gently sloping. Next to the sea there is a desert-like belt of varying breadth with algal drift--quite large stones are often floated onto the beach by means of Fucus vesiculosus attached to them. Above the foreshore a ridge of sand, the foredune, is often formed on exposed shores and built up by sand-collecting plants, above all Ammophila arenaria and Elymus arenarius. Mobile dunes (formed by wind) have often once been devoid of vegetation, but are colonized especially by Ammophila in later stages when factors, responsible for sand mobility, have been eliminated. The earliest colonizers of the naked sand are crustaceous lichens, especially Lecidea uliginosa, L. granulosa, and Stereocaulon condensatum, accompanied by bryophytes, especially Ceratodon purpureus and Cephaloziella sp. In most districts, the foredune is succeeded inland by relatively smooth dry sandy fields, a type of heath inhabited by

several continental species and many southern calcicolous therophytes characteristic of 'alvar' vegetation on Gotland and Oland. The vegetation along the south and southeast coasts of the Baltic Sea is described. (Jones-Wisconsin)
W74-12556

EFFECTS OF TOXAPHENE CONTAMINATION ON ESTUARINE ECOLOGY,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 5C.
W74-12592

APPLICATION OF ERTS-1 DATA TO THE PROTECTION AND MANAGEMENT OF NEW JERSEY'S COASTAL ENVIRONMENT,
Earth Satellite Corp., Washington, D.C.
R. L. Mairs, R. T. Macomber, D. Stanczuk, F. J. Wobber, and R. S. Yunghans.
Available from NTIS, Springfield, Va 22161 as N74-16009, Price $5.00 printed copy; $2.25 microfiche. Progress Report No 304 to NASA Goddard Space Flight Center for the period July-December 1973. 47 p, 7 fig, 4 tab, append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Mapping, *Land use, Coasts, *New Jersey, Environment, Data collections, Monitoring, Flood plains, Waste disposal, Path of pollutants.
Identifiers: ERTS.

Data from Earth Resources Technology Satellite (ERTS) has proven of value to New Jersey in monitoring dispersion and extent of offshore wastes disposal practices, detecting changes (primarily development) in the coastal zone, monitoring large scale circulation patterns in the nearshore zone, and in delineating coastal land resources and ecozones. ERTS is of greatest value to the State in terms of: land use change detection; waterfowl game management; offshore waste disposal; and floodplains mapping. (Knapp-USGS)
W74-12639

QUANTIFICATION OF SHORELINE MEANDERING,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 2J.
W74-12643

HYDRAULIC CONSTANTS OF TIDAL ENTRANCES 1: DATA FROM NOS TIDE TABLES, CURRENT TABLES AND NAVIGATION CHARTS,
Florida Univ., Gainesville. Coll. of Engineering.
M. P. O'Brien, and R. R. Clark.
Available from NTIS, Springfield, Va. 22161 as AD-773 627, Price $3.75 printed copy, $2.25 microfiche. Coastal and Engineering Laboratory, Technical Report No 21, November 1973. 47 p, 7 fig, 6 chart, 5 tab, 22 ref. ONR Contract N00014-68-A-0173-0020.

Descriptors: *Tidal waters, *Tidal effects, *Inlets(Waterways), *Discharge coefficient, Currents(Water), Roughness(Hydraulic), Discharge(Water), Tidal streams, Tides.
Identifiers: Salinity gradient.

The flow in tidal inlets may be analyzed by means of empirical coefficients which are defined by a simple flow relationship. Methods commonly used in analyzing flow through tidal entrances on sandy coasts make assumptions regarding the geometry of the inlets and related flow regime which depart substantially from real flow conditions. Evaluation of the published data pertaining to the hydraulics of entrances indicates that the data are sufficiently accurate and representative to permit the determination of discharge coefficients and to identify categories of entrances with characteristic flow regimes. (Humphreys-ISWS)
W74-12648

PARTICLE SIZE DISTRIBUTION AND SMALL-SCALE BED-FORMS ON SAND WAVES, CHESAPEAKE BAY ENTRANCE,
Old Dominion Univ., Norfolk, Va. Inst. of Oceanography.
J. C. Ludwick, and J. T. Wells.
Available from NTIS, Springfield, Va. 22161 as AD-774 947, Price $4.50 printed copy, $2.25 microfiche. Technical Report No 12, January 15, 1974. 116 p, 24 fig, 14 tab, 66 ref. NR 388-098. ONR-GP Contract No N00014-70-C-0083.

Descriptors: *Sand waves, *Chesapeake Bay, *Sediment transport, Sedimentary structures, Sediment sorting, Statistical methods, Variability, Particle size, Provenance, *Virginia.

The relationship between sediment texture and topography was studied along five series of sand waves in Chesapeake Bay entrance, Virginia. Two types of sand waves are present: asymmetrical, migrating sand waves have coarse sediment on crests and fine in troughs, and near-symmetrical, stationary sand waves have fine sediment on crests and coarse in troughs. In general, bimodal sediment is present on crests of migrating sand waves and in troughs of stationary sand waves. There is a progressive decrease in percentage of bimodal samples in the Bay entrance sand wave field with distance to the southeast, the direction of net sediment transport. Analysis of variance verifies textural trends. At times when currents are of sufficient strength to move all sediment sizes, brown coarse sand is carried from a source northwest of the sand wave field and mixed with the predominant gray fine sand. As velocities decrease, coarser sediment is deposited. A winnowing process continues to move finer sizes such that texturally distinct crests and troughs result. Observations by SCUBA divers reveal the widespread occurrence of small-scale bed-forms surmounting sand waves. Analysis of variance shows these trends insufficient to obscure observed sand wave textural trends. (Knapp-USGS)
W74-12650

THE SALINITY GRADIENT AND VEGETATION IN THE SAUGATUCKET RIVER ESTUARY,
Rhode Island Univ., Kingston. Coll. of Resource Development; Rhode Island Univ., Kingston. Dept. of Botany.
E. M. Smith, and R. D. Wood.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10165, $2.75 in paper copy, $2.25 in microfiche. Rhode Island Univ. Marine Technical Report Series No 6. 5 p, 3 fig, 1 tab, 3 ref.

Descriptors: *Salinity, *Vegetation, *Estuaries, Saline water-freshwater interfaces.
Identifiers: *Saugatucket River(RI), South Kingstown(RI), Point Judith Pond(RI), Salinity dilution.

The Saugatucket River in South Kingstown, Rhode Island, discharges into Point Judith (Salt) Pond, diluting the seawater along the estuary. To locate the region of greatest salinity change, 20 stations were established. On November 6, 1971, water samples were taken at low and high tide at the lower four stations. Samples were also taken at low water and four hours after low water at stations 8-16 on November 11 and at stations 1-7 on November 12. The delayed sampling was done to check the water at the period of maximum dilution. The plant life, growing and healthy at the stations, was recorded. Water samples were titrated for salinity. The plant life provides a continuously operating salinity monitoring system. Results of the work in Point Judith Pond show that the greatest dilution (change in salinity) is in the mouth of the Saugatucket River from a point just above the Silver Lake Road bridge to the point where the river empties into Upper Pond and plant life occurs in predictable zones along this estuary, species being linked to the overall salinity range. (Jones-Wisconsin)
W74-12667

VEGETATIONAL ZONATION IN TWO SUCCESSIONAL BRACKISH MARSHES OF THE CHESAPEAKE BAY,
Duke Univ., Durham, N.C. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W74-12689

AUTOMATED GAS CHROMATOGRAPHIC ANALYSIS OF SULFUR POLLUTANTS,
Varian Aerography, Walnut Creek, Calif.
For primary bibliographic entry see Field 5A.
W74-12690

PRIMARY PHYTOPLANKTON PRODUCTIVITY IN THE EASTERN MURMAN BAYS, (IN RUSSIAN),
Murmanskii Morskoi Biologicheskii Institut (USSR).
For primary bibliographic entry see Field 5C.
W74-12703

ECTOPARASITIC INFUSORIA OF STICKLEBACK FROM THE NEVA DELTA, USSR, (IN RUSSIAN),
N. N. Banina.
Parazitologiya. Vol 7, No 3, p 220-226. 1973. Illus. English summary.
Identifiers: *Infusoria, *Stickleback, *USSR(Neva delta), *Ectoparasites.

Gasterosteus aculeatus and Pungitius pungitius are infected en masse with various ectoparasitic Infusoria. Complex relationships arising in this peculiar biocoenosis between true parasites (Trichodina), Infusoria feeding on bacteria from water depths (Apiosoma, Epistylis) and predatory forms (Erastophrya) are considered.--Copyright 1974, Biological Abstracts, Inc.
W74-12706

A CONTRIBUTION TO THE ECOLOGICAL STUDY OF THE BOU REGREG ESTUARY: THE PROBLEM OF POLLUTION,
Institut Scientifique Cherifien, Rabat (Morocco). Lab. of Zoology.
For primary bibliographic entry see Field 5C.
W74-12712

HELMINTHS OF SOCKEYE SALMON (ONCORHYNCHUS NERKA) FROM THE KVICHAK RIVER SYSTEM, BRISTOL BAY, ALASKA,
Battelle-Pacific Northwest Labs., Richland, Wash. Ecosystems Dept.
For primary bibliographic entry see Field 5C.
W74-12719

THE LACK OF INORGANIC REMOVAL OF DISSOLVED SILICA DURING RIVER-OCEAN MIXING,
University of South Florida, St. Petersburg. Marine Science Inst.
For primary bibliographic entry see Field 5G.
W74-12724

CLASSIFICATION AND COMMUNITY STRUCTURE OF MACROBENTHOS IN THE HAMPTON ROADS AREA, VIRGINIA,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5A.
W74-12727

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

CONCEPTUAL DESIGN STUDY OF A 200 MILLION GALLON PER DAY VTE/MSF DESALINATION PLANT AND PROTOTYPE MODULE,
Westinghouse Electric Corp., Lester, Pa.
D. Cane, D. M. Giorgione, J. W. Keen, D. L. Moen, and R. L. Nalbone.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 229, $15.00 in paper copy; $2.25 in microfiche. Office of Saline Water, Report INT-OSW-RDPR-74-972, October 1970. 197 p, 16 ref. OSW Contract 14-30-2700.

Descriptors: *Desalination plants, Nuclear energy, *Flash distillation, Nuclear powerplants, Electric power production, *Operating costs, *Capital costs.
Identifiers: Dual-purpose power water plant.

A multiple-effect distillation system which employs an enhanced surface-vertical tube evaporator (VTE) as the basic element was selected as the primary object of this study. The VTE/MSF system was optimized to a system which would produce pure water from seawater at the minimum cost. A conceptual design of a prototype/module was developed which, when built, will demonstrate the feasibility of the 200 MGD plant. The minimum expected capacity of the prototype/module is 2.5 MGD. A conceptual design of a 200 MGD optimized conventional MSF distillation plant was also developed to determine the cost of water using this system. The total estimated capital cost of the MSF plant is $143,601,000 and the water cost with public financing is 43.2 cents/1000 gal. The capital cost of the protytype/module, not including engineering and interest during construction, is estimated to be $4,384,000. It appears that the VTE/MSF system offers a potential reduction of approximately 12% in water cost as compared to the conventional MSF system for large capacity plants (15 MGD and above). A comparison of the capital costs indicates a reduction of approximately 6% in favor of the VTE/MSF system. (OSW)
W74-12207

PROCESS AND APPARATUS FOR MAKING HIGHLY PURE WATER,
Hitachi Ltd., Tokyo (Japan).
K. Izumi, and Z. Tamura.
U.S. Patent No. 3,816,266, 4 p, 2 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 923, No 2, p 672, June 11, 1974.

Descriptors: *Patents, *Evaporation, *Condensation, *Desalination, *Power plants, Fresh water, Equipment.

Hot sea water emerging from an indirect condenser is subjected to flash evaporation and the steam generated by the flash evaporation is condensed to obtain fresh water. The apparatus comprises a plurality of vertical casing assemblies each consisting of a combination of a sea water flash chamber linked with an indirect condenser for receiving pre-heated sea water. The invention is applied to a 600 MW steam-power plant. The steam generated in a boiler is used for rotating a steam turbine and a dynamo to generate electricity. The major portion of the steam is condensed into water in a condenser. Water is obtained from the condenser at the rate of about 1,040 tons/h. Sea water is used as cooling water in the condenser, and at the power plant the sea water is supplied to the condenser at the rate of 69,700 tons/h. (Sinha-OEIS)
W74-12450

METHOD AND APPARATUS FOR SALINE WATER CONVERSION,
P. S. Roller.
U.S. Patent No. 3,814,671, 5 p, 6 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 923, No 1, p 261, June 4, 1974.

Descriptors: *Patents, *Desalination, *Vaporization, *Condensation, *Evaporation, Saline, Fresh water, Scaling.
Identifiers: Scale formation, Alkaline bicarbonate, Alkaline scale.

Saline water containing scale-forming alkaline bicarbonate is indirectly heated while avoiding alkaline scale, due to the presence of recycled CO2. The heated saline water is flash vaporized and alkaline bicarbonate thermally decomposed, forming CO2, a precipitate of alkaline scale compound and flashed saline water. The flashed vapor with included CO2 is condensed and the CO2 released from hot condensate as evolved CO2; the latter is recycled to the saline water, while discharging excess evolved CO2. Precipitate of alkaline scale compound is separated from flashed saline water and employed as nucleant for precipitate formed in flash vaporization, whereby the thermal decomposition is accelerated. The flash vaporization may be conducted in stages, a slight residual of alkaline bicarbonate in the flashed saline water being thereby reduced to an indefinitely small value. The flashed saline water is evaporated in a multi-stage flash evaporator; or this combined with a surface heat evaporator forming concentrated brine and fresh water at high yield. (Sinha-OEIS)
W74-12455

REVERSE OSMOSIS FOR MUNICIPAL WATER SUPPLY,
Du Pont de Nemours (E.I.) and Co., Inc., Wilmington, Del.
For primary bibliographic entry see Field 5D.
W74-12513

3B. Water Yield Improvement

SURVEY OF WEATHER MODIFICATION IN THE SOVIET UNION: 1973,
Arizona Univ., Tucson. Inst. of Atmospheric Physics.
L. J. Battan.
Available from NTIS, Springfield, Va 22161 as PB-222 822, Price $4.75 printed copy; $2.25 microfiche. Scientific Report No 27, May 1973. 51 p, 90 ref. NSF Grant GA-13949.

Descriptors: *Weather modification, *Reviews, *Research and development, Fog, Clouds, Foreign research.
Identifiers: *USSR.

Soviet research in weather modification is reviewed. Hail suppression and precipitation stimulation are major areas of activity in the USSR, and in recent years research on lightning suppression and the use of heat for the dissipation of warm fog in stratus has been studied. The articles surveyed show little evidence that Soviet scientists, unlike their American counterparts, are convinced of the value of randomized experiments in the evaluation of cloud seeding hypotheses and there is no evidence in this literature that Soviet scientists have been tackling the modification of large-scale weather phenomena. (Knapp-USGS)
W74-12061

PROJECT FOGGY CLOUD V, PANAMA CANAL WARM FOG DISPERSAL PROGRAM,
Naval Weapons Center, China Lake, Calif. Research Dept.
R. S. Clark, T. L. Wright, R. W. Evert, R. B. Loveland, and R. E. Northup, Jr.
Available from NTIS, Springfield, Va 22161 as AD-773 473, Price $4.00 printed copy; $2.25 microfiche. Technical Publication 5542, December 1973. 92 p, 51 fig, 17 tab, 19 ref, 2 append.

Descriptors: *Weather modification, *Fog, *Canal zone, Cloud seeding, Monomolecular films, Aircraft, Clouds, Cloud physics, Meteorological data, Tropical regions.
Identifiers: *Fog dispersal, Warm fogs.

Fogs that close the Panama Canal to navigation occur mainly in the Gaillard Cut section of the canal from August through November. In 1972 experiments were conducted along the Gaillard Cut to test a number of different means of dispersing and suppressing fog. Among the techniques tested were seeding by helicopter and fixed-wing aircraft with various fog-dispersal agents, ground-based seeding with various agents, and fog suppression by spreading monomolecular films on the canal surface. Also, tropical cumulus clouds were characterized. Several techniques proved promising enough to warrant further investigation and development. Most promising for the canal area was the suppression of fog by monomolecular films. Also promising were airborne seeding with glycerine and ground-based seeding with charged bubbles. (Knapp-USGS)
W74-12067

FOG CLEARING USING HELICOPTER DOWNDRAFTS: A NUMERICAL MODEL,
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
W. S. Nordquist, Jr.
Available from NTIS, Springfield, Va 22161 as AD-771 038 Price $3.75 printed copy; $2.25 microfiche. Research and Development Technical Report ECOM-5527, December 1973. 68 p, 5 fig, 8 tab, 34 ref, append.

Descriptors: *Fog, *Weather modification, *Aircraft, *Mathematical models, Numerical analysis, Cloud physics, Ice fog, Particle size.
Identifiers: *Helicopters, *Fog dispersal.

Clearings can be made in fog when water drops are dispersed from a helicopter, but the downwash from the helicopter rather than the dispersed water might be the cause of the clearing. The feasibility of creating temporary clearings was demonstrated for shallow fogs at high, middle, and low latitudes, stratus cloud decks at low latitude, and ice fog at high latitude. The technique and its effects were simulated using a model which can be expressed mathematically and solved numerically. A one-dimensional (vertical space dimension) parametric model combines the basic meteorological characteristics of a horizontally homogeneous fog existing in a laminar flow regime and the downward flow of air created by a hovering helicopter during the initial stages of downdraft formation. The fog is characterized by vertical profiles of temperature, relative humidity, liquid water content, and horizontal wind speed and direction. The initial model formulation of the downdraft beneath the helicopter is characterized as air being drawn into the plane of the rotor blades horizontally from the environment and being forced downward after the combustion processes of the helicopter engines have increased the temperature and water vapor content. From the initial conditions at the helicopter hover level, the model provides estimates of the temperature, liquid and vapor water content, physical dimensions and speed of the downdraft during its descent. At the level where the downdraft speed becomes zero, the assumed level of maximum downdraft penetration, quantitative estimates are made of the dimensions of areal clearing, temperature, and relative humidity differences between the downdraft and the environment, the horizontal displacement of the downdraft, and the liquid water content at the downdraft base. (Knapp-USGS)
W74-12081

3C. Use Of Water Of Impaired Quality

STUDIES ON THE EFFECTS OF SEWAGE EFFLUENT ON SELECTED GROUPS OF ARTHROPODS AND PHYTOPATHIC NEMATODES.
Michigan State Univ., East Lansing. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W74-12202

3D. Conservation In Domestic and Municipal Use

PLANNING AND HUMAN VALUES - AN INQUIRY INTO THE PHENOMENON OF URBAN GROWTH AND THE POSSIBILITY OF ITS CONTROL THROUGH WATER AND LAND RELATED ACTIONS,
Abt Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W74-12354

THE CONCEPT OF CARRYING CAPACITY,
Utah State Univ., Logan. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 6B.
W74-12469

ENFORCING ENVIRONMENTAL LAW IN THE CITY,
New York City Corporation Counsel.
For primary bibliographic entry see Field 6E.
W74-12471

APPRAISAL OF OPERATING EFFICIENCY OF RECHARGE BASINS ON LONG ISLAND, NEW YORK, IN 1969,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-12655

3E. Conservation In Industry

RECOVERY OF TOXIC METALS FROM INDUSTRIAL EFFLUENT SOLUTIONS BY SOLVENT EXTRACTION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-12033

WATER QUALITY CONSIDERATION FOR THE METAL MINING INDUSTRY IN THE PACIFIC NORTHWEST,
Environmental Protection Agency, Seattle, Wash.
For primary bibliographic entry see Field 5G.
W74-12085

MANAGEMENT INFORMATION IN THE WATER INDUSTRY,
Sunderland and South Shields Water Co. (Ontario).
For primary bibliographic entry see Field 4A.
W74-12111

PRIMARY DATA ON ECONOMIC ACTIVITY AND WATER USE IN PROTOTYPE OIL SHALE DEVELOPMENT AREAS OF COLORADO: AN INITIAL INQUIRY,
Colorado State Univ., Fort Collins. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-12356

PROCEEDINGS OF THE XV EUCEPA CONFERENCE ON HARMONIZING PULP AND PAPER INDUSTRY WITH ENVIRONMENT,
For primary bibliographic entry see Field 5G.
W74-12400

PULP MILL WATER SYSTEM CLOSURE,
Swedish Forest Products Research Lab., Stockholm.
For primary bibliographic entry see Field 5D.
W74-12411

ESTABLISHMENT OF A CLOSED SYSTEM FOR THE PAPER MAKING PROCESS,
For primary bibliographic entry see Field 5D.
W74-12412

DESIGN PRINCIPLES OF WHITE WATER SYSTEMS WITH SPECIAL REFERENCE TO EFFLUENT CONTROL,
Jaakko Poyry and Co., Helsinki (Finland).
For primary bibliographic entry see Field 5D.
W74-12413

FRACTIONAL INPLANT TREATMENT OF RECYCLE FLOWS BY ADVANCED TECHNIQUES,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 5D.
W74-12414

CLARIFICATION OF WHITE WATER BY VACUUM FILTRATION (KLAERUNG VON WEISSWASSER DURCH VAKUUM-FILTRATION),
For primary bibliographic entry see Field 5D.
W74-12415

EFFECTS OF RAW MATERIALS AND CHEMICAL ADDITIVES ON MILL EFFLUENT LOSSES,
Research Association for the Paper and Board, Printing and Packaging Industries, Leatherhead (England).
For primary bibliographic entry see Field 5D.
W74-12416

THE TREATMENT AND REMOVAL OF WASTE WATER RESIDUAL SLUDGES IN THE PAPER INDUSTRY (DIE BEHANDLUNG UND BESEITIGUNG VON RESTABWASSERSCHLAEMMEN DER PAPIERINDUSTRIE),
Muenchen-Dachauer Papierfabriken Heinrich Nicolaus G.m.b.H. (West Germany).
For primary bibliographic entry see Field 5E.
W74-12417

THE USE OF SILICATES AND POLYELECTROLYTES FOR FLOCCULATION,
Papiripari Vallalat Kutato- es Fejlesztointezete, Budapest (Hungary).
For primary bibliographic entry see Field 5D.
W74-12420

THE BIOLOGICAL PURIFICATION OF PAPER INDUSTRY WASTE WATERS (DIE BIOLOGISCHE REINIGUNG VON RESTABWAESSERN DER PAPIERINDUSTRIE),
Cellulose Attisholz A.G., Luterbach (Switzerland).
For primary bibliographic entry see Field 5D.
W74-12421

TERTIARY METHODS OF WASTE TREATMENT,
Balfour-Italia, Rome (Italy).
For primary bibliographic entry see Field 5D.
W74-12422

ACTIVATED CARBON AND OTHER TECHNIQUES FOR COLOR REMOVAL FROM KRAFT MILL EFFLUENTS,
Saint Regis Paper Co., Pensacola, Fla.
For primary bibliographic entry see Field 5D.
W74-12423

NEW FINE PARTICLE TECHNOLOGIES APPLIED TO THE ENVIRONMENTAL PROBLEMS OF THE PAPER INDUSTRY,
English China Clays Ltd., Saint Austell (England).
For primary bibliographic entry see Field 5D.
W74-12424

A STUDY OF THE EFFLUENT TREATMENT FROM AN ITALIAN PAPER MILL,
Cartiera del Timavo, Trieste (Italy).
For primary bibliographic entry see Field 5D.
W74-12425

IMPACT OF POLLUTION ABATEMENT ON CAPITAL ALLOCATION AND PROFITABILITY,
Canadian Pulp and Paper Association, Montreal (Quebec).
For primary bibliographic entry see Field 5G.
W74-12426

AN INTERESTING METHOD OF ABATING POLLUTION IN THE PULP AND PAPER INDUSTRY,
Ecolgenova, S.p.A., Genoa (Italy).
For primary bibliographic entry see Field 5D.
W74-12431

OIL AND GAS VERSUS WATER IN THE SOUTHWEST: CONFLICT OR COMPROMISE,
Humble Oil and Refining Co., Corpus Christi, Tex.
For primary bibliographic entry see Field 6E.
W74-12549

3F. Conservation In Agriculture

INTERREGIONAL IMPACTS OF ALTERNATIVE WATER POLICIES FOR IRRIGATION IN WESTERN UNITED STATES,
Wisconsin Univ., Madison. Dept. of Agricultural Economics., and Wisconsin Univ., Madison. Dept. of Forestry.
N. L. Meyer, and D. W. Bromley.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 635, $4.75 in paper copy, $2.25 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report WRC-WIS74-03, June 1974. 133 p, 8 fig, 11 tab, 64 ref, 5 append. OWRT B-057-WIS(4).

Descriptors: *Water policy, *Water allocation(Policy), *Alternative water use, *Regional economics, *Regional development, Water resources development, *Water distribution(Applied), *Farm management, Crop production, Sweet potatoes, Transportation, Idaho, Maine, *Irrigation water, *Cost analysis.
Identifiers: Red River Valley.

An evaluation framework was developed which permits measuring the interregional effects that would result from water resource projects in the West. Further, the framework facilitates identification of intraregional shifts associated with project-induced interregional impacts. Impacts of four water policies were considered. Alternative water policies are: (a) continue present policy, (b) cease new construction and honor existing contracts on present projects, (c) build new water projects but increase water charges on new projects and (d) build new water projects only if they can repay the cost of delivering water for both new and existing projects. Each policy change was evaluated by region with respect to changes in

acreage, total revenue, farm revenue, processing revenue and transportation revenue. Aggregate changes in farm, processing and transportation revenues were also shown. Fall potatoes were used as a vehicle for the analysis. Continuing present water policy would encourage expansion of acreage in areas utilizing subsidized water. Production would remain constant or decline in higher cost production areas. Continuing present pricing policies on existing projects and ceasing construction of new projects implies expanded production would have to be through technical change in water use or through increased acreage in regions not dependent on publicly subsidized water.
W74-12002

EFFECT OF ROW SPACING, SEED RATE, NUTRITION AND IRRIGATION ON ROOT GROWTH, NODULATION, QUALITY AND UPTAKE OF NUTRIENTS IN PEA (PISUM SATIVUM L. VAR. ARVENSE POIR.),
Irrigation Research Centre, Sambalpur (India).
D. Lenka, and O. P. Gautam.
Indian J Agric Sci. Vol 42, No 8, p 676-680, 1972.
Identifiers: *Fertilizers, *Growth rate, Irrigation, *Nitrogen, Nutrients, Nutrition, *Peas, Pisum-sativum-var-arvense, Root zone, Seed, Absorption.

The length and weight of pea were not significantly influenced by the seed rate, row spacing and low dose of starter N. Application of starter N to the soils low in available N increased nodulation, but application to soils high in available N decreased it. Phosphate application and irrigation at both pre-flowering and flowering stages increased root growth and nodulation.--Copyright 1973, Biological Abstracts, Inc.
W74-12156

THE ANSWER OF THE SOIL GENETIC CRITERIA TO THE QUESTION OF THE FUNCTION AND DURABILITY OF AMELIORATING SUB-SOILING OF PSEUDOGLEY,
Institut National de la Recherche Agronomique, Tunis (Tunisia).
For primary bibliographic entry see Field 2G.
W74-12157

PRIMARY CHECKING OF DATA ON MOISTURE RESERVES IN SOIL WITH ELECTRONIC COMPUTERS, (IN RUSSIAN),
For primary bibliographic entry see Field 2G.
W74-12159

SPRINKLER IRRIGATION AND ITS PROFITABILITY ON GRAIN GROWING FARMS IN SOUTHERN FINLAND, (IN FINNISH),
Finnish Forest Research Inst., Helsinki.
O. Kara.
Suom Maataloustiet Seuran Julk. 127. p 1-108, 1972. Illus. English summary.
Identifiers: *Barley, *Finland, Grain farms, Irrigation, Malting, Profits, Spring, *Sprinkler irrigation, *Wheat.

Irrigation often makes it possible to get malting rather than fodder barley and is recommended where feasible. Irrigation of spring wheat also often has good results.--Copyright 1974, Biological Abstracts, Inc.
W74-12182

NITROGEN AND PHOSPHORUS LOSSES FROM AGRONOMY PLOTS IN NORTH ALABAMA,
Alabama A and M Univ., Normal.
For primary bibliographic entry see Field 5B.
W74-12221

CHARACTERISTICS OF WATER REGIME OF MALE AND FEMALE DIOECIOUS PLANTS AS A SIGN OF ADAPTATION TO A POOR WATER SUPPLY, (IN RUSSIAN),
M. V. Sivtsev, and S. S. Sizov.
Biol Nauki 15(10): 78-82. Illus, 1972.
Identifiers: Adaptation, Asparagus, *Dioecious plants, Hemp, Lombardy poplar, Mulberry, Box elder, *Leaves.

The water regime of female leaves of diclinous plants (hemp.) spinach, sorrel, willow, asparagus, box elder, Lombardy poplar, mulberry) is more labile than male leaves. Female plants in comparison to male ones have a wider range of changeability which results in a higher degree of adjustment to the fluctuation of the water available to the plants. However, in an acute water shortage, the female plants exhibit less resistance than male leaves.--Copyright 1974, Biological Abstracts, Inc.
W74-12237

CULTIVATION OF LAMINARIA IN JAPAN,
Hokkaido Regional Fisheries Research Lab., Yoichi (Japan).
Y. Hasegawa.
Bull Hokkaido Reg Fish Res Lab. 37, p 46-48. 1971.
Identifiers: *Cultivation, *Japan, *Laminaria, *Reefs.

Cultivation of Laminaria involves mainly the use of stones or concrete blocks and blasting of reefs - preparing new surfaces on reefs by digging old ones which are exposed at low tide. Emphasis is on the cultivation of Laminaria on natural reefs. Cross-breeding a few species has been achieved.--Copyright 1974, Biological Abstracts, Inc.
W74-12292

GHANATS OF IRAN: DRAINAGE OF SLOPING AQUIFER,
Iranian Plan and Budget Organization, Tehran. Technical Bureau.
For primary bibliographic entry see Field 4B.
W74-12318

SOME EVIDENCE OF ECONOMICS OF SCALE IN HAWAIIAN SUGAR PLANTATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
J. E. T. Moncur.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 903, $3.25 in paper copy, $2.25 in microfiche. Technical Memorandum Report No 38, January 1974. 45 p, 17 fig, 3 tab, 18 ref. OWRT A-026-HI(1). 14-31-0001-3211.

Descriptors: *Sugar crops, Economics, *Hawaii, *Economies of scale, *Economic efficiency, Regression analysis, Water utilization, Withdrawal.
Identifiers: *Farrell's method, Unit isoquants, Oahu(HI).

Of the major sectors in Oahu's economy, sugar growing and milling together use by far the largest quantities of water. The three plantations still operating on Oahu in 1971 accounted for 57 percent of total withdrawals, even though this percentage has steadily declined over the past decade or longer. A persistent trend among plantations, moreover, is for mergers to occur, presumably to take advantage of economics of scale. The effect of scale on sugar production was evaluated. Data for plantations on four of the Hawaiian Islands is applied in several procedures for estimating scale economics and economic efficiency. First, a 'survivorship' test is used. Then the efficiency measures developed by M. J. Farrell are calculated. Finally, some regression estimates are determined.
W74-12344

SUBSURFACE IRRIGATION WITH HEATED WATER, ITS MANAGEMENT AND APPLICATION TOWARD REDUCTION OF THERMAL POLLUTION PROBLEMS,
Minnesota Univ., Minneapolis. Dept. of Agricultural Economics.
E. R. Allred.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 036, $3.00 in paper copy, $2.25 in microfiche. Water Resources Research Center, Univ. of Minnesota, St. Paul, Mimeographed Report, June 1974. 20 p, 13 fig, 1 tab, 3 ref. OWRT B-057-Minn(1). 14-31-0001-3602.

Descriptors: Irrigation, Soils, Crops, *Minnesota, Thermal pollution, *Heated water, *Subsurface irrigation, Potatoes.
Identifiers: *Waste heat energy, *Soil-warming.

The purpose was to evaluate the use of waste heat energy for the growing of agricultural crops in northern climates, to determine the basic heat transmissibility characteristics of soil, and to evaluate crop frost protection benefits as the result of the soil warming process. The layout and the procedures described are based on field studies on a Hubbard loamy sand located at the Sand Plains Experimental Irrigation Field, near Elk River, Minnesota. The following conclusions can be made for the data obtained: Soil warming is necessary for extension of the growing season for field crops in Minnesota. Soil-warming cannot be done effectively by using an irrigation system alone. Artificial warming of a field soil by utilization of waste heat energy does not provide a significant protection for potatoes against frost at temperatures below 28 deg. F. Maturity date for early potato varieties grown in heated soil can be advanced between two and three weeks, as compared to potatoes grown in unheated field soils. Only small quantities of waste heat energy can be utilized by a field soil in Minnesota during July and August. Moderate second crop yields are possible with heated soils in Minnesota, if replanting is done immediately following the first crop harvest. Because of unreasonably low air temperatures encountered in 1974, the early potato harvest date was not advanced appreciably over 1973, even though frost protection measures were installed. (Walton-Minnesota)
W74-12358

LARGE SPRINGS IN THE BLACK HILLS, SOUTH DAKOTA AND WYOMING,
South Dakota School of Mines and Technology, Rapid City. Dept. of Geological Engineering.
P. H. Rahn, and J. P. Gries.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 066, $3.25 paper copy, $2.25 in microfiche. South Dakota Water Resources Institute, Brookings, Completion Report, February 1973, 24 p, 36 ref. OWRR A-021-SDAK(2).

Descriptors: *Groundwater movements, *Springs, Streamflow, *Recharge, *South Dakota, *Wyoming, Water loss, *Groundwater recharge.
Identifiers: *Black Hills Area(So Dak).

Between 1966 and 1971, monthly stream gagings were conducted on most large streams and springs in the Black Hills of South Dakota and Wyoming. Streams draining the impermeable Precambrian core of the Hills lose an average of 40.5 cfs to sinkholes where streams cross the Paleozoic limestone belt flanking the Precambrian core. At the outer edge of the limestone large springs occur where the Triassic Spearfish acts as an impermeable dam to groundwater. The average of these springs is at least 189.4 cfs. The difference between the stream flow loss and the spring discharge is due to precipitation recharge falling directly on the limestone. Since there is probably little deep groundwater loss from this system, precipitation recharge and evapotranspiration rates on the limestone can be established. In general the

northern Hills has a precipitation recharge of at least 6.8 inches/year and the southern Hills at least 0.6 inches/year. Groundwater flow directions, based on dye tests, piezometric levels and discharge measurements show a generally southerly flow of ground water in the eastern flank of the limestone from the Rapid City area toward Hot Springs. (Wiersma-South Dakota)
W74-12367

OPERATIONAL EVALUATION OF IRRIGATION SYSTEMS,
South Dakota State Univ., Brookings. Water Resources Inst.
D. D. Brosz.
Available from National Technical Information Service, Springfield, Va 22161 as PB-236 042, $3.25 in paper copy, $2.25 in microfiche. Completion Report, June 1974. 22 p, 12 fig, 7 tab, 4 ref. OWRT A-030-SDAK(1).

Descriptors: Sprinkler irrigation, Subsurface irrigation, Trickle irrigation, Irrigation operation, Water requirements, Scheduling, Timing, *Irrigation design, Evaluation, *Irrigation systems, Corn(Field), Potatoes, *South Dakota, *Crop response, *Crop production.

Three years' data were collected on yield responses of potato and corn crops irrigated by trickle, subsurface, and sprinkler irrigation systems. The field plots study included six irrigation system design treatments including every row and every other row trickle and subsurface irrigation; small frequent sprinkler application and larger infrequent sprinkler application. Potato and corn production can be increased by 5 to 15 percent with 20 percent less water when it is applied through the use of trickle and subsurface irrigation rather than through sprinklers. A water savings of approximately 30 to 40 percent can be achieved with trickle and subsurface irrigation for yields that are comparable to those obtained with sprinklers. Tensiometers installed in the plots did show that the soil water tension was higher for the trickle and subsurface plots. The irrigation system design treatments had no effect on potato crop maturity or quality; however, the corn grain quality for the sprinkler system applying small frequent irrigations was adversely affected because of black masses of spores (smut) appearing on the ears. (Wiersma-South Dakota State)
W74-12368

MIGRATION OF INSECTS CAUSED BY ERECTION OF IRRIGATIONAL MAINS, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W74-12396

FORCED CULTIVATION OF LAMINARIA,
Hokkaido Regional Fisheries Research Lab., Yoichi (Japan).
Y. Hasegawa.
Bull Hokkaido Reg Fish Res Lab. 37 p 49-52, 1971.
Identifiers: *Cultivation, *Japan, *Laminaria, Temperature, *Plant growth, Plant reproduction.

Laminaria of good quality are usually 2-yr-old plants, those that go through 2 winters. A technique was developed for raising food quality plants in 1 yr. Good quality juvenile plants are produced 2-3 mo. ahead of natural germination time, and cultivation starts when water temperature is below 18C. Blades (10-15) of Laminaria are grown per meter of rope. The culture methods and the growth and reproduction of the plants are described.--Copyright 1974, Biological Abstracts, Inc.
W74-12397

ANALYSIS OF PUMPING WELL NEAR A STREAM,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 4B.
W74-12531

THE QUANTITY AND MOVEMENT OF NITRATES IN SOIL WATER IN TWO CONNECTICUT SOILS TREATED WITH HIGH AND LOW LEVELS OF INORGANIC NITROGEN FERTILIZER,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 5B.
W74-12595

YUMA IRRIGATION PROJECT--NOTICE OF OPERATION AND MAINTENANCE CHARGES.
Federal Register, Vol 37, No 240, p 26536-26537, December 13, 1972.

Descriptors: *Administrative agencies, *Regulation, *Irrigation, Operation and maintenance, *Maintenance costs, *Use rates, Water users, Water supply, Irrigation efficiency, Land reclamation, Water allocation(Policy), *California, *Arizona, Federal government, Water requirements, Water delivery, Agriculture, Irrigation water, Water management(Applied), Water contracts, Irrigation permits, Operating costs.
Identifiers: *Administrative regulations.

Public notice is given of annual operation and maintenance charges and annual water rental charges, by the Department of the Interior, for the Yuma Irrigation Project in Arizona and California. The minimum operation and maintenance charge is $15.75 per irrigable acre. The water user is entitled to eight acre-feet of water per acre and payment is made whether or not the water is used. Up to five acre-feet is available on non-sandy land. Additional water, if available, will be furnished at $4.00 per acre-foot payable in advance. Credit for unused additional water will be given towards the succeeding years minimum charges. On written request and approval, water will be furnished to a water user free for reclaiming lands by the usual methods. Lands for which free water was served during the preceeding year will not get any more free water, unless in the opinion of the Project Manager, the results in the preceding year were unsatisfactory. All charges for water are payable in advance. If a water user fails to comply with any regulations, or if he does not pay bills or expenses of extra maintenance caused by faulty irrigation practices, the right to withhold delivery of maintenance caused by faulty irrigation practices, the right to withhold delivery of water is reserved. Late payments are penalized at .5% per month on the unpaid balance. (Sperling-Florida)
W74-12614

IRRIGATION AS A PRACTICAL MEANS TO CONTROL POTATO COMMON SCAB (STREPTOMYCES SCABIES): FINAL EXPERIMENT AND CONCLUSIONS,
Rothamsted Experimental Station, Harpended (England).
D. H. Lapwood, L. W. Wellings, and J. H. Hawkins.
Plant Pathol. Vol 22, No 1, p 35-41. 1973. Illus.

Descriptors: *Patotoes, Irrigation effects, Control, Infection, Diseases.
Identifiers: Benomyl, Oxycarbon, Scab, Streptomyces-scabies.

In 1971, irrigation had little no effect on yields but, when applied early in the season, greatly decreased common scab on the susceptible cultivars 'King Edward,' 'Majestic' and 'Desiree'. 'Record,' and especially 'Pentland Crown,' had little scab with or without irrigation. Most scab infection occurred during dry weather in late June and early July. Irrigation for 6 wk from 4 June, at 0.6 in. (15 mm) soil moisture deficit (SMD) controlled scab most effectively, but 6 wk was only marginally better than 4 wk. With other regimes, the severity of scab increased as the SMD allowed irrigation was increased. 'King Edward' tubers from unirrigated plots were blemished more in 1971 than in the 2 previous dry seasons, partly because rain caused tubers to swell more than previously and enlarged scab lesions to much that healthy tissue between scabs was ruptured. More tubers per plant were formed from 'King Edward' when seed tubers were treated with benomyl and oxycarboxin before planting than when untreated, but irrigation even from 75% emergence had no effect on tuber numbers.--Copyright 1973, Biological Abstracts, Inc.
W74-12694

RECENT DEVELOPMENTS IN PREPARING COLORED AGROCLIMATIC MAPS BY COMPUTER,
Department of Agriculture, Ottawa (Ontario).
For primary bibliographic entry see Field 7C.
W74-12695

EVALUATING CLIMATIC LIMITATIONS FOR A SPECIFIC AGRICULTURAL ENTERPRISE,
National Oceanic and Atmospheric Administration, Washington, D.C. Environmental Data Service.
Y. M. Yao.
Agric Meteorol., Vol 12, No 1, p 65-73, 1973.
Identifiers: Agricultural, *Climatic conditions, Dry, Enterprise, Evaluation, *Irrigation, Moisture, *Peanuts, Soils, *Tanzania, Africa.

The East Africa Goundnut (Peanut) Scheme of the late 1940's cited as an example of a costly miscalculation of land use that might have been prevented by climatic assessment. At the site of this scheme, in what is now central Tanzania, water is the most restrictive factor determining natural environment. Adequate soil moisture, both near the surface and in the deeper root zone, is essential for groundnut production. Soil moisture data derived for Dodoma for 30 yr show that in the period mid-Jan.-mid-April the probability that the topsoil will remain dry for at least 16 consecutive days is 57%, and drops only to 37% for 21 or more consecutive days - even though this is the 'rainy season'. The analysis further indicates that the elimination of the most serious periods of moisture shortage would require irrigation, at least once a year, in about 75% of the years. Moisture supplies are optimum for Dec.-April in only about 3% of the yr in both Dodoma and Kongwa. For comparison, the same type of climatological analysis for Tifton, Georgia and Norfolk, Virginia in the major peanut producing areas of the eastern coastal plains region of the USA, indicates that 30 yr produced no occurrences of dry topsoil for as long as 16 consecutive days. Also, the climate there is so suitable for growing peanuts that irrigation in only 10% of the yr would practically eliminate all except the minor periods of water shortage hazard. The condition in Tifton is slightly less favorable than in Norfolk. However, even there, optimum moisture conditions were not high during the critical months.--Copyright 1974, Biological Abstracts, Inc.
W74-12699

ESTABLISHMENT OF GREEN PANIC AS INFLUENCED BY TYPE, AMOUNT AND PLACEMENT OF VEGETATIVE MULCH,
Western Australia Univ., Nedlands. Dept. of Agronomy.
K. G. Rickert.
Aust J Exp Agric Anim Husb., Vol 13, No 62, p 268-274, 1973.
Identifiers: Density, Dolichos-lablab, Emergence, *Green panic, *Mulch, Panicum-maximum-var-trichoglume, Sawdust, Seedling, Sorghum, Stubble, Vegetative mulch.

Establishment of green panic (Panicum maximum var. trichoglume cv. 'Petrie'), was measured after sowing beneath mulches of sawdust, native pasture hay, barley straw, Dolichos lablab stubble

and sorghum stubble. Long, chaffed, or milled materials, all applied at 2500, 5000, or 10,000 kg/ha were tested. Comparisons were made with a control (no mulch) in 2 experiments on a self-mulching clay at Gayndah, south-eastern Queensland (Australia). Seedling emergence with all surface mulches was superior to the control and to emergence from sowing into mulch incorporated in the surface soil. Optimum rates of mulch for emergence approached 5000 kg/ha but varied between experiments and with mulch types. Reducing mulch particle size did not consistently improve emergence relative to long straw. In a 3rd experiment, seedling emergence at 42 days after irrigation was directly related to the proportion of area covered by mulch irrespective of the arrangement of mulch bands. Seedling yield followed trends in plant density. Practical implications of the results are discussed.--Copyright 1974, Biological Abstracts, Inc
W74-12700

EFFECT OF SOIL WATER POTENTIAL ON GROWTH AND YIELD OF SUNFLOWER (HELIANTHUS ANNUUS),
Pahlavi Univ., Shiraz (Iran). Dept. of Irrigation.
N. Sionit, S. R. Ghorashy, and M. Kheradnam.
J Agric Sci. Vol 81, No 1, p 113-116. 1973. Illus.
Identifiers: Growth rates, Helianthus annuus, *Sunflower, *Soil water.

The effect of soil water potential of the root media on the vegetative growth, seed and oil yield of sunflower (cv. 'Record') grown in containers under field conditions was investigated. The weight of shoots and the total leaf area of plants before flowering significantly decreased with decrease in the water potential of the root media. There was a sharp reduction of shoot weight as the potential decreased from -0.32 to -1.25 bars and then a further slow decline as soil water potential dropped to -8.6 bars. There were no significant differences in the 100-seed weights and percentage of oil among the treatments, but the total number of seeds was significantly different. The data did not indicate the existence of a threshold water potential above which yield was independent of soil water potential, but rather that yield was a continuously decreasing function of soil water potential.--Copyright 1974, Biological Abstracts, Inc.
W74-12705

EFFECT OF DROUGHT ON CALLOSE DYNAMICS IN PLANT ANTHERS, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
E. I. Barskaya, N. V. Balina, and E. V. Kanash.
Dokl Akad Nauk SSSR Ser Biol. Vol 208, No 2, p 476-478. 1973. Illus.
Identifiers: Anthers, *Beans, *Callose, *Drought.

A comparative microscopic study of preparations of anther developmental phases of control and experimental bean plants established certain unique anomalies in the dynamics of callose in plants subjected to drought. If drought acted on the anther at the start of callose production, there was nonuniform deposition on the surface of the protoplast, along with thin layers of callose there were massive clusters stained bright red by Procion red. It is natural that irregularity in the deposition of callose should involve also a disturbance in its protective function against dehydration.--Copyright 1974, Biological Abstracts, Inc.
W74-12713

INFLUENCE OF THE RATIO BETWEEN MATRIC AND OSMOTIC SUCTIONS ON THE OAT AND FIRST-YEAR ALFALFA YIELDS, (IN RUMANIAN),
Institutul de Studii si Cercetari Pedologie, Bucharest (Rumania).
A. Maianu, I. Axenova, I. Albescu, and A. Maniu.
An Inst Stud Cercet Pedol. 39, p 39-48. 1971. English summary.
Identifiers: *Alfalfa, *Soil moisture, *Oats, *Osmotic pressure.

The influence of soil total suction, resulting from matric and osmotic suction, on growth and yields of alfalfa and oats was studied. Plants were cropped on 3 soils of different texture types: coarse, medium and fine. Good oat and alfalfa yields can be obtained on non-saline soils if soil moisture does not decrease under 50% of soil available water and under soil equivalent moisture, respectively. The increase of osmotic solution suction at these soil moisture levels greatly decreases the yields. Increase of soil moisture up to the value of field water capacity decreases the negative effect of salts. Minimum oat and alfalfa yields were obtained on sandy soils at all values of total suction, independently of the ratio between matric and osmotic suction.--Copyright 1974, Biological Abstracts, Inc.
W74-12715

EFFECT OF CORN STOVER ON PHOSPHORUS IN RUN-OFF FROM NONTILLED SOIL,
Guelph Univ. (Ontario). Dept. of Land Resource Science.
J. W. Ketcheson, and J. J. Onderdonk.
Agron J. Vol 65, No 1, p 69-71, 1973.

Descriptors: *Corn(Field), *Runoff, *Mulching, Fe.tilizers, Phosphates, Erosion control, Soil stabilization, Cultivation, Soil management, Phosphorus.
Identifiers: *Stover.

The effect of stover on soil and P removal was determined for a well-drained till soil (Guelph loam) with 7% slope. Corn (Zea mays L.) was planted without tillage after 32P-tagged P fertilizer was applied broadcast and covered with a corn stover mulch in 1 treatment or left bare in a 2nd treatment. Run-off was collected and analyzed from 1 simulated and from 2 natural rainfall events. Stover reduced soil P in run-off by 65% and fertilizer P by 97%. These reductions were achieved by a decrease in total run-off and by a decrease in the concentration of suspended soil in it. Of the 29 kg of fertilizer P applied per ha, 3.85 kg (13%) and 0.13 kg (less than 1%) were removed over all run-off events from the no stover and stover treatments, respectively. This corresponded to 8.5 and 1.3%, respectively, of the total P removal, which varied from 45 kg/ha without stover to 10 kg/ha with stover. The liquid fraction of the run-off carried the least amounts of either soil or fertilizer P. Proportionately more fertilizer P was found in the coarse (greater than 50 micro) soil than in the fine fraction (less than 50 micro), whereas proportionately more soil P was found in the latter than in the former, suggesting that fertilizer P is preferentially associated with the coarse fraction.--Copyright 1973, Biological Abstracts, Inc.
W74-12722

INVESTIGATIONS OF THE METEOROLOGICAL INFLUENCES ON THE INCREASE OF DRY MATTER AND STALK LENGTH FOR SPRING BARLEY AND WINTER WHEAT IN THE PANNONIAN CLIMATE AREA: I. METHOD SYNOPSIS AND RESULTS OF THE PRELIMINARY EXPERIMENTS OF 1970, (IN GERMAN),
Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
W. Mueller, and P. Ruckenbauer.
Arch Meteorol Geophys Bioklimatol Ser B Klimatol Umweltmeteorol Strahlungs Forsch. Vol 21, No 1, p 77-98, 1973. Illus. (English summary).
Identifiers: *Barley, Temperature, *Solar radiation, *Soil moisture.

Correlations were analyzed between biometeorological parameters and dry matter increase of spring barley (Hordeum vulgare) and winter wheat (Triticum aestivum) during approximately 5-day intervals. Some significant statistical correlations between total solar radiation, soil temperature in the root zone, soil water balance and the dry matter increase of cereal plants were observed.--Copyright 1974, Biological Abstracts, Inc.
W74-12729

NITRATES, NITRITES; THEIR RELATIONSHIP TO ANIMALS, MAN: IV. FACTORS CAUSING A CONCENTRATION IN FODDER CROPS OF NITRATES, NITRITES: THEIR DEPENDENCE UPON ECOLOGICAL FACTORS; TIME OF STORAGE, (IN GERMAN),
Institut fuer Immunobiologie, Berlin (East Germany).
For primary bibliographic entry see Field 5B.
W74-12741

CHARACTERISTICS OF THE WATER REGIME OF PEAS AT DIFFERENT SOIL MOISTURE LEVELS AND WITH THE USE OF MOLYBDENUM, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W74-12749

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

SURFACE-WATER INVESTIGATIONS ON THE LUMMI INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
G. G. Parker, Jr.
Open-file report, 1974. 69 p, 21 fig, 7 tab, 14 ref, append.

Descriptors: *Surface waters, *Aquiculture, *Estuaries, *Indian reservations, *Washington, Sea water, Water quality, Water circulation, Rivers, Dye releases, Dispersion, Path of pollutants, Fish hatcheries, Water pollution effects.
Identifiers: *Lummi Indian Reservation(Wash).

Surface waters were investigated on the Lummi Indian Reservation, Washington. The investigation was oriented to potential water-related problems which could affect the success of the Lummi Indians' aquaculture program. Included were studies of (1) the Skookum Creek hatchery, which hatches and raises fish for the Indians, (2) the Kwina Slough fish pens, which use water from the slough and Nooksack River, (3) traveltimes and rates of dispersion of water in the Nooksack River and the slough relative to possible effects of pollutants from upstream areas, and (4) the aquaculture pond and adjacent marine waters, to determine volume of the pond and the patterns of water movement within, and to and from, the pond. Water discharge in Kwina Slough ranged from zero to more than 1,300 cubic feet per second, and, between high tides during low-flow periods, there is not sufficient channel storage to provide continuously flowing water through the fish pens. Thus, year-round operation of the fish pens in Kwina Slough is not feasible and the fish must be removed prior to the low-flow period. The aquaculture pond on Lummi Bay has a maximum volume of over 80 million cubic feet of sea water. Dye studies in the pond indicate that the primary control of the movement of water entering the pond is the volume of the inflowing water, which is controlled by the tide height and condition of tide gates. Most of the water that enters the pond inlet gates originates in Hale Passage. Samples of the inflowing water contained very little sediment, and deposition is negligible. The sanitary quality of the marine waters is good. (Knapp-USGS)
W74-12008

UNITED STATES GEOLOGICAL SURVEY ALASKA PROGRAM, 1974.
Geological Survey, Washington, D.C.
Circular 700, 1974. 63 p, 15 fig, 51 ref.

Descriptors: *Alaska, *Geology, *Water resources, *Research facilities, *Projects, Investigations, Geologic investigations, Data collections, Surveys.

This report on the Alaskan activities of the U.S. Geological Survey contains up-to-date accounts of recent results and summaries of plans for the summer of 1974. It is organized in six parts: (1) responsibilities and services of the Geological Survey; (2) organization of the U.S. Geological Survey; (3) Alaskan field activities for 1974; (4) cooperative programs with state and federal agencies; (5) summary of important results of geological and geophysical research in 1973, and (6) reports published by Survey authors in 1973. (Knapp-USGS)
W74-12012

GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO USING ERTS-1 DATA: PROGRESS REPORT II.
Colorado School of Mines, Golden. Dept. of Geology.
For primary bibliographic entry see Field 7B.
W74-12016

WATER RESOURCES OF THE POWDER RIVER BASIN AND ADJACENT AREAS, NORTHEASTERN WYOMING,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12056

ERTS-1 APPLICATIONS IN HYDROLOGY AND WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W74-12062

PREDICTING DEPTH-DISCHARGE RELATIONSHIPS FOR SAND-BED RIVERS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
V. J. Galay, and J. M. Cheung.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 129-143. 6 fig, 2 tab, 25 ref.

Descriptors: *Stage-discharge relations, *Alluvial channels, Sands, Regime, Dunes, Discharge(Water), Hydraulics, Flow measurement, *Discharge measurement, Stream gages, Water measurement.
Identifiers: *Sand-bed rivers.

The many methods available for the prediction of depth-discharge relationships for natural sand-bed rivers are reviewed. These methods are based on a variety of basic assumptions as well as a wide range of data. Application of these methods to several types of rivers indicates that some of them are unreliable. Data from several sand-bed rivers was re-analyzed and a method based on adjustment of the flow depth was developed. This method yields reliable depth-discharge relationships for sand-bed rivers in the low flow regime (dunes). (See also W74-12087) (Knapp-USGS)
W74-12093

WATERSHED MODELLING USING A SQUARE GRID TECHNIQUE,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-12105

COMPUTER USES IN WATER SYSTEMS: CONFERENCE PAPERS.
Water Research Association, Marlow, (England).
For primary bibliographic entry see Field 6A.
W74-12109

MANAGEMENT INFORMATION IN THE WATER INDUSTRY,
Sunderland and South Shields Water Co. (Ontario).
R. R. W. E. White, and S. Shail.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 11-27, September 1973.

Descriptors: *Management, *Reviews, Computers, *Water supply development, *Industries, Computer programs, Economics.
Identifiers: Regional Water Authorities(Eng), Costing, Statistical reports, Information.

Presented is a review of the current use of computers in providing management information in the water supply industry. First, the present situation in the industry as a whole is considered. Reported are the findings of a Sub-Committee on the use of computers in the Water Industry, set up in July of 1966. Second, some practical problems encountered in the provision of management information in the medium-sized Sunderland and South Shields Water Company (England) are examined. Until fairly recently, the quantity of information such as costing and statistical reports has been too little and its availability has been too late. Work done by the 360/25 computer is discussed; considered are the machine's six suites of programs: (1) water rate accounting; (2) accountancy and costing; (3) payroll; (4) metered supply accounting; (5) stocks and dividends; and (6) engineering and operational. Finally, future prospects for management in the water supply industry are discussed. The industry is being absorbed into a more complex organization, with objectives changing due to a scarcity of national resources. Future demands must be estimated. The new Regional Water Authorities, set up in April 1964, hold responsibility for all the services forming the various parts of the hydrological cycle; the objectives of all these authorities will presumably be the same. This presents a perfect opportunity to install computing facilities on an industry-wide basis. (See also W74-12107) (Bell-Cornell)
W74-12111

AN INTEGRATED MODEL FOR THE PLANNING AND OPERATION OF WATER SYSTEMS,
Water Research Association, Marlow, (England).
Economics Group.
For primary bibliographic entry see Field 6A.
W74-12113

SYSTEMS AND TECHNIQUES FOR RESOURCE PLANNING,
Water Resources Board, Reading (England).
For primary bibliographic entry see Field 6A.
W74-12114

FORECASTING POLLUTION IN RIVERS, ESTUARIES AND THE SEA,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5B.
W74-12116

REMOTE CONTROL OF A WATER SYSTEM USING AN ON-LINE MINI COMPUTER,
East Worcestershire Waterworks Co. (England).
For primary bibliographic entry see Field 7C.
W74-12121

AN INTRODUCTION TO COMPUTER INFORMATION SYSTEMS IN DISTRIBUTION,
R. R. Miller.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 265-274, 25-27 September 1973. 3 fig, 9 ref.

Descriptors: Computers, *Water supply, *Networks, *Data collections, Water distribution(Applied), Communication, Management, Planning, Graphical methods, Maps.
Identifiers: *Information collection, Regional Water Authorities(England), Tabular techniques, Cartographic techniques.

Various computer techniques for recording, retrieving and presenting information concerning water supply systems and networks, in both the specific and the broadest sense, are introduced. Tabular and cartographic techniques are dealt with, including the digitization of Ordnance Survey maps. Examples of particular applications already used in urban planning systems, including line printer maps using letter intensity and overprinting, are considered. The paper concludes with a look at other more advanced graphical techniques. Information regarding a distribution system and the other parameters affecting water supply must be easily summarized, digested and up-dated; the first and largest phase of these ventures is information collecting. As this information becomes more generally available, the techniques described and form a basis of systems for its presentation to all interested parties. (See also W74-12107) (Bell-Cornell)
W74-12122

COMPUTER USES IN WATER SYSTEMS: CONTRIBUTED PAPERS.
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 6A.
W74-12126

PROPOSED KIELDER WATER RESERVOIR SCHEME COMPUTER APPLICATION IN YIELD ASSESSMENT,
Northumbrian River Authority (England).
U. V. Burston.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 20-25, 25-27 September 1973. 3 fig.

Descriptors: *Computer programs, *Simulation analysis, *Water supply development, *Water demand, *Withdrawal, Water transfer, Reservoirs, Rivers, Design, Operations, Flow, Data collections, Catchments, Systems analysis, Estimating.
Identifiers: *River authorities.

Described is the proposed Kielder Water Scheme designed to meet future major industrial and domestic demands within the three-river Northumbrian River Authority area. The scheme consists of a 44,000 m.g. capacity regulating reservoir, a major river intake and pumping station, and a 25-mile-long aqueduct. The proposed water release and transfer strategy is described briefly. On the basis of a three-year design period and assumed abstraction (withdrawal) conditions, the yield of the scheme was assessed by hand calculating the maximum demands which could be met by the system, including the presently existing reservoir and river abstraction operations. Discussed is a computer program for simulation of the daily operation of the proposed system. In this program, the computer daily examines the natural flow at the abstraction point on the three rivers, based on gaging station records, adjusts this flow for the effect of any reservoirs in the catchment and calculates the gross make-up required (if any) at each abstraction point, using an assumed figure of 15% for operating losses. The study has indicated that the basic Kielder Water Scheme would, on present demand estimates, meet additional demands

within the River Authority's area until the years 2005 and 2003 respectively. (See also W74-12107) (Bell-Cornell)
W74-12130

GENERAL ENGINEERING COMPUTER USE AT THE WELLAND AND NENE RIVER AUTHORITY,
Welland and Nene River Authority (England).
M. V. Gibbons.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 26-29, 25-27 September 1973.

Descriptors: Computers, *River basin commissions, *Water resources, *Design, *Land use, *Drainage, *Computer programs, Hydrometry, Data processing, Environmental engineering, Hydrology, Simulation analysis, Dynamic programming, Reservoirs, Mathematical models, Systems analysis.

In 1969, a computer aided design center was made available to the Authority as a result of work relating to hydrological design of a reservoir. Described briefly is the center's multiple access system and ainteractive computing facilities. Computer work presently being carried out by the Authority is divided into three groups: (1) water resources design; (2) land drainage design; and (3) hydrometric data processing. A brief description is given of some of the main programs under each of the three groupings. Considered in group 1 are the production of synthetic data from short records, the use of digital simulation models, and dynamic programming for producing detailed optimal reservoir control rules. From group 2, the author considers two backwater curve programs based on the standard step method, the plotting of river cross sections, and determination of the capacities of flood storage reservoirs. Mentioned briefly from group 3 are a program developed for use with license classification and analysis, and the design of flat-vee weirs. These descriptions indicate the general use to which the computer is being put in the Engineer's department of a medium sized River Authority. (See also W74-12107) (Bell-Cornell)
W74-12131

THE DESIGN OF A TWO-RESERVOIR RIVER REGULATING SCHEME,
South Staffordshire Waterworks Co. (England).
M. H. Harley, and T. R. E. Chidley.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 30-34, 25-27 Septem 1973. 2 fig, 3 ref.

Descriptors: *Design, *River regulation, *Reservoirs, *Dynamic programming, Stochastic processes, Decision making, Reservoir releases, Flow, Alternative planning, Probability, Computers, Systems analysis, Water demand, Simulation analysis.
Identifiers: *River Dee(North Wales).

Described are the principal findings of a study in which the Dynamic Programming Principle was applied to the design of a river regulation scheme. The problem was to find how much water to release each month from each reservoir to meet the demand for regulation and compensation water. Effectiveness was measured by the sum of the deficits incurred over a long period of time. Different methods of applying the technique of dynamic programming were explored. It was found that stochastic dynamic programming introduced problems of state space; policy iteration and value iteration were considered in terms of efficiency and convergence to the global optimum. For stochastic dynamic programs the policy iteration technique was found to be unsuitable in practice. Deterministic dynamic programming was found to yield near optimal policies for even short flow sequences of 25-50 years. In each case, the policy determined by the dynamic program was simulated on historic and synthetic flow data. This whole process was embedded into a version of the Problem Oriented Language HYDRO developed by the authors. Deterministic dynamic programming was found to be an easy, efficient, and flexible technique for reservoir operations design. Its yielded policies were as good as those developed by weeks of simulation. (See also W74-12107) (Bell-Cornell)
W74-12132

THE USE OF A COMMERCIAL TIME-SHARING COMPUTER FOR WATER RESOURCE PLANNING,
Severn River Authority (England).
For primary bibliographic entry see Field 6A.
W74-12133

WATER RESOURCE DEVELOPMENT SYSTEM,
Cornwall River Authority, Launcestor (England).
F. L. Oates.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 39-51, 25-27 September 1974. 9 fig.

Descriptors: *Water resources development, *Computer programs, *Water supply, *Regional development, Design, Operations, Management, Reservoirs, Hydrology, Costs, Economics, Decision making, Mathematical models, Systems analysis, Simulation analysis.
Identifiers: Alternative schemes, Comparison, River authorities.

In order to deal with the multiplicity of sources and reservoir sites possible for development, the Cornwall River Authority evolved a computer-based system for the comparison of schemes on a common basis and for the design and operation of integrated regional water supplies. A costing manual was prepared providing unit costs and curves for all elements of water resources development schemes. Standard programs for costing assessment of yield of reservoir schemes were developed. The economics of various patterns of development to meet present and future demands were then compared on a regional basis. From over 70 alternative future reservoir sites, 3 were selected to serve the Authority's area. It was found that considerable savings could be achieved by the complete integration and linking of existing and proposed future water supply systems. Computer programs, simulating the systems through a synthetic drought flow pattern, were used for design purposes. To make accurate evaluation of operating costs and drawdown, the systems had to be simulated through long term flow sequences. This work was found to have obvious applications in the field of operational management. Programs are being developed to devise operating rules and management instructions to minimize operating costs and reservoir drawdowns. (See also W74-12107) (Bell-Cornell)
W74-12134

COMPUTER AIDED ECONOMIC DESIGN OF WATER DISTRIBUTION SYSTEM,
University Coll., London (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-12140

COMPUTER ORIENTED APPROACH OF A WATER DISTRIBUTION SYSTEM,
National Inst. of Scientific Research, Quebec.
H. Demard, B. Bobee, and J. P. Villeneuve.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 85-88, 25-27 September 1973. 5 ref.

Descriptors: *Water distribution(Applied), *Networks, Computers, *Water demand, *Data processing, Pricing, Water resources, Research, Analysis.
Identifiers: Real-time control.

A prevailing approach to water distribution is one which considers water as a limited resource and aims at influencing the demand, by using such means as pressure variation, drawing up a water rate structure, etc. At INRS-Eau, a research group is studying and achieving the measures which may be used in this approach. Their program consists of comprehensive analysis of the different components of a water distribution network: (1) the demand structure (space-time variations); (2) the network's behavior; (3) the real time control as a result of the two previous steps; and (4) a pricing policy. Achievement of these steps involves data acquisition, processing and analysis, as well as process control and therefore necessitates computer aid. These steps are discussed together with the role played by the computer in accomplishing them. Computers are the major tools for: acquisition of demand data; building up a forecasting model; knowledge of system behavior; and real-time control of the system. (See also W74-12107) (Bell-Cornell)
W74-12142

AN INVESTIGATION OF THE OPTIONAL ON-LINE CONTROL OF A WATER SUPPLY NETWORK,
Cambridge Univ. (England). Engineering Lab.
F. Fallside, and P. F. Perry.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 89-93, 25-27 September 1973. 3 fig, 4 ref.

Descriptors: *Water supply, *Networks, *Operations research, *Simulation analysis, Computers, Operating costs, Reservoirs, Pipes, Optimization, Flow, Mathematical models, Equations, Systems analysis, Linear programming.
Identifiers: *On-line control, *Cost minimization, Production plants, Daily, Non-linear programming.

For distribution systems it is often appropriate to use an optimal control in which control inputs are calculated to minimize a performance index subject to certain constraints imposed by the plant; operating cost is well-defined and can be included in the performance index, leading to least cost operation of the network. The technical problems in implementing such a control are discussed. A collaborative project for introducing an optimal on-line control for a specific water supply network is described. System modeling and formulation of the optimal control problem are discussed. The model chosen for the water system simulates the plant by a series of nodes, each of which has associated with it some or all of the following elements: (1) production plant; (2) reservoirs; (3) pipelines; and (4) boosters. The optimization program finds the optimal flows every 2 hours for meeting the typical daily consumption pattern. It also calculates best flow distribution between source stations for meeting the base of the consumer load and the optimum reservoir levels for meeting the diurnal fluctuation in demand. Calculations were done on an IBM 370/165 computer with relatively little computer time. The ultimate aim for the on-line optimal control of the network is to produce an integrated set of programs covering prediction, analysis and optimization which will operate satisfactorily in an on-line environment. (See also W74-12107) (Bell-Cornell)
W74-12143

LAY-OUT AND DIAMETER OPTIMIZATION FOR A LOOPED WATER TRANSPORTATION NETWORK,
Municipal Water Works of Rotterdam (Netherlands).
J. Haijkens, and A. Wedemeier.

In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 94-97, 25-27 September 1973. 1 fig, 3 equ.

Descriptors: *Water distribution(Applied), *Networks, *Design, Constraints, *Water supply development, Water demand, Pipe flow, Pressure, Water works, *Optimization, Investment, Costs, Equations, Mathematical models, Systems analysis.
Identifiers: *Pipe diameter, Looped networks, Pipe bursts, Algebraic symbols, Surplus capacity.

Considered is the optimization of water distribution systems. In the case of a looped network, an approximation of an optimum is a difficult iterative procedure, which does not always yield the desired solution. To deal with this problem, the Rotterdam Waterworks is considering the importance of building the requirements for a continuous water supply to customers into a programming model. An objective is to insure that even during pipe burst, sufficient water can be supplied under reasonable pressure to each user. Discussed are the constraints which must be set in designing such a looped network. Demands must be made to the mutual ratio of the diameters of the incoming or outgoing pipes of a junction, and a certain surplus capacity must be introduced into the network. The outgoing pipes--in case of a burst in an incoming pipe--should be considered as potential incoming pipes. Formation of the objective function requires judgement about the pressure drop per unit of pipe length. A simple example illustrates how a relationship can be found between the flow capacity and the investment costs for the laying on of a pipe with a certain diameter. (See also W74-12107) (Bell-Cornell)
W74-12144

ANALOGUE AND HYBRID METHODS FOR THE ANALYSIS AND PLANNING OF WATER DISTRIBUTION NETWORKS,
Ring-Belt Ltd. (West Germany); and Montan-Forschung (West Germany).
P. Powell, J. Reitz, and P. A. Ziller.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 98-100, 25-27 September 1973.

Descriptors: *Water distribution(Applied), *Networks, *Analog computers, *Analog models, Digital computers, Systems analysis, Planning, Simulation analysis, Pipes, Hazen-Williams equation.
Identifiers: *Hybrid technique.

Described are developments in the use of Analogue computers for the analysis of water distribution networks and the combination of the best of both Analogue and digital techniques in the Hybrid method. In the special purpose, direct Analogue, the flow of current through electronic circuits is used to simulate quantitatively the flow of water through a pipe network. There are three basic types of unit: (1) source units (power supplies); (2) pipe cells (resistance cells); and (3) load cells These units may be connected together to represent a given system by means of a patchboard arrangement. In the Hybrid technique, the digital machine is used where most effective--in handling and presenting all the figures involved in the exercises, e.g., in preparing the data for setting up the Analogue. The digital can cross-check the data and results from the Analogue (and vice versa); moreover, it can check the validity of network simplifications used on the Analogue. (See also W74-12107) (Bell-Cornell)
W74-12145

ALLUVIAL GRASSLAND ECOSYSTEMS: HABITAT CHARACTERISTICS,
Ceskoslovenska Akademie Ved, Brno. Botanicka Ustav.
For primary bibliographic entry see Field 2I.
W74-12161

UPPER WABASH SIMULATION MODEL. PROGRAM DOCUMENTATION AND EXTENSION,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
S. Tuffuor, D. Lyman, and G. H. Toebes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 832, $3.25 in paper copy, $2.25 in microfiche. Purdue University Water Resources Research Center, Technical Progress Report, June 1974. 107 p, 10 tab, 14 fig. OWRT-A-012-IND(6), A-026-IND(4), A-016-IND(4).

Descriptors: *Reservoir operations, *Reservoir management, *Reservoir releases, *Multiple purpose reservoirs, *Simulation analysis, Recreation, Flood control, Reservoir storage, Routing, *Model studies, *Indiana, *Computer programs.
Identifiers: *Wabash River(Ind), Reservoir operating policy, Muskingum routing model, Balancing policy, Drainage area ratio policy, Storage volume ratio policy.

A daily simulation model was developed for the Upper Wabash Reservoir River System in Indiana. The motivation for this work was to apply the systems approach to a major river basin with the objective of elucidating water resources planning, management and evaluation questions. The core of this project was a study of reservoir operating rules using a daily quantity simulation model. Three preceding reports outlined the construction of the model and the different operating policies used. This report deals with the documentation of all the quantity simulation programs written to date for the Upper Wabash simulation model. Prior to the documentation effort the Computer programs were written in a more modular form to improve computation efficiency. Computation times were decreased up to 50 percent. An extension to the model, which is not geographic in nature, would be adding a forecast model. This would bring it closer to being a practical tool for reservoir operations. (See also W74-12196)
W74-12197

SNOW-AIR INTERACTIONS AND MANAGEMENT OF MOUNTAIN WATERSHED SNOWPACK,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 2C.
W74-12201

MICROWAVES, A NEW TOOL FOR FOREST AND WATERSHED MANAGEMENT,
Montana State Univ., Bozeman. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 7B.
W74-12205

FLOOD CONTROL, NAVIGATION, AND OTHER ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA,
Minnesota Univ., Minn. Dept. of Agricultural and Applied Economics.
For primary bibliographic entry see Field 6F.
W74-12206

AN EVALUATION OF TAILINGS PONDS SEALANTS,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5G.
W74-12217

MULTIPURPOSE WATER RELATED DEVELOPMENT IN URBAN AREAS,
California Univ., Berkeley. Hydraulics Lab.
J. A. Harder.
Available from the National Technical Information Service as PB-235 904 $3.00 in paper copy; $2.25 in microfiche. Completion Report, May, 1974, 8 p, 2 ref. (California Water Resources Center Project UCAL-WRC-W-289). OWRT-B-128-CAL(3).

Descriptors: *Flood control, Water management(Applied), Streamflow, *California, *Cities, *Design flood, Alternative costs, *Multiple-purpose projects, Institutional constraints, *Cost sharing, *Federal project policy, Benefits.
Identifiers: *San Francisco Bay(Calif).

Four streams in the San Francisco Bay Region were studied from the standpoint of designing flood control systems that would incorporate park and recreational benefits in addition to flood control benefits. Such designs were generally more expensive than alternative single purpose flood controls systems. Institutional obstacles to a multipurpose use of stream areas are described. A planning a agency with a broad responsibility is needed to carry out planning for multipurpose use of urban stream areas. Also a change in federal cost sharing regulations would encourage multipurpose use. (Snyder-California, Davis)
W74-12226

AN OPTICAL PLANIMETER FOR LEAF AREA DETERMINATION,
Georgia Uiv., Athens. Inst. of Ecology., and Forest Service (USDA), Southeastern Forest Experiment Station. Franklin, N.C.
For primary bibliographic entry see Field 2I.
W74-12229

TEMPORAL CHANGES IN BIOMASS, SURFACE AREA AND NET PRODUCTION FOR A PINUS STROBUS L. FOREST,
Forest Service (USDA), Franklin, N.C. Southeastern Forest Experiment Station.
W. T. Swank, and H. T. Schreuder.
In: IUFRO Biomass Studies, International Union of Forest Research Organizations, Working Party on the Mensuration of the Forest Biomass, 1973, Vancouver British Columbia, Canada, University of Maine at Orono, College of Life Sciences and Agriculture, p 171-182. 2 fig, 5 tab, 11 ref.

Descriptors: *Biomass, *White pine trees, *Primary productivity, Evapotranspiration, Vegetation effects.
Identifiers: Plant surface area.

Weighted, linear regression models were used to estimate biomass and surface area of foliage, branches, and stems from tree basal area for a planted white pine stand on a 16.1 hectare watershed. Estimates were made at stand ages 10, 12, and 15 years. During the 5-year period, the stand closure changed from partial to complete and model coefficients showed large changes, particularly for foliage. In February 1972, aboveground biomass for the population was 4,664, 22,825, and 42,110 kilograms per hectare for foliage, branches, and stems. The population of trees contained 9.9, 2.3, and 0.4 hectares of foliage, branches, and stems per hectare of land surface. Net primary production was estimated to be 13,500 kilograms per hectare per year, and foliage development for the pine population culminated when the stand was only 12 years old. Intra- and interspecies comparisons show that data are in the upper range of values reported for forests. Streamflow data for the watershed demonstrate the dynamic nature of changes in stand structure and hydrologic processes.
W74-12231

COMPARISON OF THREE METHODS OF ESTIMATING SURFACE AREA AND BIOMASS FOR A FOREST OF YOUNG EASTERN WHITE PINE,
Forest Service (USDA), Franklin, N.C. Southeastern Forest Experiment Station.

W. T. Swank, and H. T. Schreuder.
Forest Science, Vol 20, No 1, p 91-100, March, 1974. 2 fig, 4 tab, 12 ref.

Descriptors: *Biomass, *White pine trees, *Statistics, Regression analysis.
Identifiers: Plant surface area, Foliar.

This paper presents estimates of foliage, branch and stem surface area, and ovendry weight, with estimates of precision of these statistics, for a 10-year-old stand of eastern white pine on a 16-ha watershed at the Coweeta Hydrologic Laboratory in the southern Appalachians. Three different methods were used to estimate the forest surface area and biomass: (1) stratified two-phase sampling, (2) two-phase sampling with a regression estimator, and (3) two-phase sampling with a ratio-of-means estimator. Stratified two-phase sampling was the most precise and appropriate method; the population was estimated to contain 5.3 ha foliage, 0.76 ha branches, and 0.13 ha stems per hectare of land surface. The estimated ovendry weight of tree components was estimated to be 2.71, 6.83, and 7.01 metric tons per hectare, respectively, for foliage, branches, and stems. The standard error of estimate for surface area and biomass ranged from 5 to 10 percent, depending upon the tree components of interest.
W74-12232

ECOSYSTEM MODELING OF A FORESTED RIVER BASIN,
Washington Univ., Seattle. Coll. of Forest Resources.
For primary bibliographic entry see Field 2A.
W74-12294

ADJUSTMENT OF RIVER CHANNEL CAPACITY DOWNSTREAM FROM A RESERVOIR,
Exeter Univ. (England). Dept. of Geography.
K. J. Gregory, and C. Park.
Water Resources Research, Vol 10, No 4, p 870-873, August 1974. 3 fig, 14 ref.

Descriptors: *Channel morphology, *Hydrologic aspects, *On-site investigations, *Channel flow, Regulated flow, Discharge(Water), Regime, Rivers, Shape, Slopes, Cross-sections, Peak discharge, Low flow, Hydrology, Surface waters, Drainage area, Reservoir releases, Flow control, Downstream, Reservoirs, Surveys, Hydraulics.
Identifiers: Channel capacity adjustment, River Tone(Somerset-United Kingdom), Clatworthy reservoir.

The construction of a reservoir may provide an opportunity to identify the way in which a changed pattern of river discharge below a dam results in an adjusted channel capacity. This was tested in the basin of the River Tone, Somerset, by comparing channel capacity above and below the Clatworthy reservoir, constructed in 1959. At a number of sites below the dam the channel cross section is multiple in form, the upper element represents the bank-full stage prior to dam construction, and the lower element is the contemporary bank-full level. The reduction of channel capacity downstream from the reservoir persists for a distance of 11 km until the catchment area contributing to the river is at least four times that draining to the reservoir. Peak discharge below the dam is deduced to be approximately 40% of the value that obtained prior to reservoir construction. (Dawes-ISWS)
W74-12298

TWO-DIMENSIONAL SEEPAGE IN LAYERED SOIL--DESTABILIZING EFFECTS OF FLOWS WITH AN UNSTEADY FREE SURFACE,
State Univ. of New York, Stony Brook.
For primary bibliographic entry see Field 2G.
W74-12315

WATER RESOURCES OF WISCONSIN, LAKE SUPERIOR BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12335

WATER RESOURCES OF WISCONSIN-MENOMINEE-OCONTO-PESHTIGO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12336

FEASIBILITY STUDY TO DEVELOP GUIDELINES FOR LAKE AND RELATED LAND RESOURCE USE DEVELOPMENT RESEARCH, OR ECONOMIC AND ECOLOGICAL IMPACT OF VARIOUS FORMS OF LAKE RESOURCE DEVELOPMENT,
New Hampshire Univ., Durham. Water Resource Research Center.
For primary bibliographic entry see Field 2H.
W74-12350

PLANNING AND HUMAN VALUES - AN INQUIRY INTO THE PHENOMENON OF URBAN GROWTH AND THE POSSIBILITY OF ITS CONTROL THROUGH WATER AND LAND RELATED ACTIONS,
Abt Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W74-12354

SOCIAL DIMENSIONS OF URBAN FLOOD CONTROL DECISIONS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
For primary bibliographic entry see Field 6F.
W74-12369

WATER QUALITY IMPROVEMENT OF STRATIFIED IMPOUNDMENTS BY SELECTIVE WITHDRAWAL OF BOTTOM WATERS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5G.
W74-12370

FLOOD PLAIN INFORMATION: KINGSLAND CREEK, CHESTERFIELD COUNTY, VIRGINIA,
Army Engineer District, Norfolk, Va.
Prepared for Chesterfield County, Virginia, April, 1974. 23 p, 7 fig, 6 tab, 11 plates.

Descriptors: *Flood plains, *Flood forecasting, *Flood profiles, Obstruction to flow, Flood data, Land use, Floodproofing, Flood stages, Flood discharge, Planning, Hurricanes, Urbanization, Flood damage, *Virginia.
Identifiers: *Kingsland Creek(Virginia), *Chesterfield County(Virginia), Richmond(Va), James River(Va), Falling Creek(Va), Swift Creek(Va), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

The relatively undeveloped and wooded flood plain adjacent to Kingsland Creek is ideal for industrial development as it is only 2 miles south of Richmond and just west of the James River. Gage readings from nearby Falling and Swift Creeks which have similar flood characteristics are used for flood information. Floods caused by heavy rainfalls which are intensified by thunderstorms and hurricanes in summer and fall can be expected in all seasons. Flood flows reach high velocities due to the steep stream gradient caused by the 'fall line' of the Coastal Plain and the Piedmont Plateau. Bridges, culverts, overhanging vegetation, and timber piles on the flood plain create obstructions to flood flow. A sewage disposal pond poses a potential health hazard. The record flood for Falling and Swift Creeks occurred July 18, 1945 and the most recent major flood occurred June 22, 1972. Discharge for an Intermediate Regional Flood (IRF) on the Kingswood would range from 7200 cfs at the mouth to 2090 cfs at the upper reach of the study area at Virginia Route 10; velocity in the main channel would average 3 to 5 ft. per second, with the height of rise at 8.5 ft. In a Standard Project Flood (SPF), the expected range of discharge is 12,590 to 2,910 ft., the average velocity 4 to 6 feet per second, and the height of rise 8.5 ft. Such floods would inundate residential and commercial properties, most significantly damaging the area near U.S. 1-301. Adoption of land use controls to guide flood plain development can be based on the data presented. (Diefendorf-North Carolina)
W74-12393

FLOOD PLAIN INFORMATION: OLDTOWN CREEK AND TRIBUTARY, CHESTERFIELD COUNTY, VIRGINIA,
Army Engineers District, Norfolk, Va.
Prepared for Chesterfield County, Virginia; March, 1974. 21 p, 7 fig, 4 tab, 11 plates.

Descriptors: *Flood plains, *Flood forecasting, *Obstruction to flow, Flood profiles, Flood data, Flood stages, Flood discharge, Flood proofing, Land use, Planning, Hurricanes, Urbanization, Flood damage, *Virginia.
Identifiers: *Oldtown Creek(Virginia), *Chesterfield County(Virginia), Seaboard Coast Line Railroad, Appomattox River(Va), Richmond(Va), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Data presented may provide a basis for the adoption of a flood plain ordinance and other regulations which can be used to prevent an increase in damages and further unregulated development in the narrow watershed where residential, municipal and commercial development already exist. Increasing urbanization of the Richmond area will create pressure for use of the Oldtown Creek flood plain. Oldtown Creek with a drainage area of about 14 square miles flows through the southern portion of Chesterfield County and through the city of Colonial Heights to its confluence with the Appomattox River. Floods caused by rain can be expected in all seasons, with larger floods caused by thunderstorms and hurricanes more likely in summer and fall. Obstructions to flow are created by 14 bridges and the limited capacity of the culvert at Seaboard Coast Line Railroad. Gaging records and newspaper files from streams in the general area indicate that flood stages rise quickly and that flow moves at high velocity. The largest flood in the area occurred in July 1945, the most recent in June 1972. Discharge can be expected to range from 6770 cfs at the mouth to 2100 cfs at the upper limit of the study area in an Intermediate Regional Flood (IRF) and from 12,160 cfs to 2700 cfs in a Standard Project Flood (SPF). Average velocity in the main channel in an IRF would be 2 to 6 ft. per second and 4 to 10 ft. per second in a SPF. Substantial damage to residential property, streets, roads and utilities may be expected from either an IRF or SPF as no flood control structures or flood plain regulations presently exist. (Diefendorf-North Carolina)
W74-12394

FLOOD PLAIN INFORMATION: MAUMEE AND AUGLAIZE RIVERS, DEFIANCE, OHIO,
Army Engineers District, Detroit, Mich.
Prepared for the Division of Water of the Ohio Department of Natural Resources, and the Maumee Watershed Conservancy District; 1970, 65 p, 6 fig, 16 tab, 16 plates.

Descriptors: *Flood forecasting, *Flood stages, Flood data, Flood plains, Flood profiles, Flood discharge, Land use, Obstruction of flood flow, Planning, *Ohio.

Identifiers: *Maumee River(Ohio), *Auglaize River(Ohio), *Defiance(Ohio), Defiance County(Ohio), Flood plain management, Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

The principal commercial district and a large residential section of Defiance, built in the area between the Maumee and Auglaize Rivers, have been inudated in the past and would be affected by future Standard Project Floods (SPF) and Intermediate Regional Floods (IRF) on both rivers. Major floods usually caused by heavy rainfall occur from October to May, with the greatest incidence in February and March. Four bridges on the Maumee and 5 bridges on the Auglaize create obstructions to flood flow. Several islands may also collect ice and debris as additional obstructions. The greatest flood occurred in March 1913, with flood discharge approximately 60% greater than the next known discharge. The most recent major flood when water was not affected by river ice was February 16, 1950 with a gage reading of 13.70 ft. on the Maumee and 26.40 ft. on the Auglaize. The Maumee may be expected to rise 5.5 to 6.0 ft. higher in an Intermediate Regional Flood (IRF) and 18.0 to 21.0 ft. higher in a Standard in an Intermediate Regional Flood (IRF) and 18.0 to 21.0 ft. higher in a Standard Project Flood (SPF), the Auglaize 5 to 6 ft. in an IRF and 19.0 to 23.0 ft. in a SPF. The impact of either an IRF or a SPF would be devasting, creating a hazardous situation in developed areas. (Diefendorf-North Carolina)
W74-12395

WAVE ENERGY CONVERTER ARRAY,
Laitram Corp., New Orleans, La.
For primary bibliographic entry see Field 7B.
W74-12438

HYDROLOGICAL REGIME OF LOWER DNIEPER SANDS IN CONNECTION WITH THEIR AFFORESTATION, (IN RUSSIAN),
For primary bibliographic entry see Field 2F.
W74-12555

BIOLOGICAL CONTROL OF WATER HYACINTH WITH INSECT ENEMIES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
E. O. Gangstad.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-775 408; $5.00 in paper copy, $2.25 in microfiche. Aquatic Plant Control Program Technical Report 6, January 1974. 152 p, 3 fig, 2 tab, 125 ref.

Descriptors: *Biocontrol, *Water hyacinth, *Insects, Aquatic weed control, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Texas, Alligatorweed, Snails, Mites, Environmental effects, Chemcontrol.
Identifiers: Utilization, Flies, Grasshoppers, Moths, Weevils, Manatees, Thrips, Flea beetles.

Because there is little possibility of eradicating the water hyacinth solely by chemical or mechanical methods in many areas of the South Atlantic and Gulf Coast states, various biological control agents are under investigation in cooperation with the USDA Entomology Division and the Corps of Engineers in the United States, Argentina, Uruguay, Trinidad, India, British Guiana, British Honduras and Guatemala. There are indications that real possibilities exist for biocontrol of water hyacinth and investigations are continuing to define the potentiality of various species of flies, caterpillars, weevils, flea beetles, thrips, moths, grasshoppers, and their host specificity. The potential environmental effects of releasing insect importations are discussed. (Auen-Wisconsin)
W74-12593

BEECH CREEK, MT. VERNON, OREGON, FLOOD CONTROL CHANNEL (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Walla Walla, Wash.
Available from National Technical Information Service, Springfield, Va 22161 as EIS-OR-73-1547-F. September 26, 1973. 47 p, 9 fig.

Descriptors: *Environmental effects, *Watershed Protection + Flood Prevention Act, *Flood protection, *Channel improvement, *Flood routing, *Oregon, Channels, Water management(Applied), Drainage, Drainage practices, Floods, Economic effects, Federal government, Flood plain zoning, Watershed management, Wildlife habitat, Rivers, Flood damage, Flood control, Runoff, Quarries, Rock excavation, Fish migration, Administrative agencies.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act, *Mt. Vernon(Ore).

The project proposal involves flood channel construction on Beech Creek for the protection of the city of Mt. Vernon, Oregon, and flood plain zoning in unprotected areas upstream and downstream from the city. Serious flooding has occurred during the winter months causing costly damage to the residential and commercial areas through which Beech Creek flows. Besides providing flood protection the work would modify the appearance of the existing channel and will require provision of a fish-way to accommodate the annual fish migration. The displacement of existing streambank vegetation and wildlife, the need for a rock quarry and the temporary disturbances in the community during construction activity constitute the adverse effects of the project. The alternatives include an upstream storage project, flood plain zoning alone or no action. These were not feasible because of their expense or inefficiency. The rock quarry site, materials, labor, and four acres of land suitable for homesites would be irreversibly committed. Comments were received from local, county, state and federal interest groups. (Dillingham-Florida)
W74-12599

BAKER LAKE WATERSHED PROJECT, FALLON COUNTY, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Bozeman, Mont.
Available from the National Technical Information Service, Springfield, Va. 22161 as EIS-MT-73-1327-F. August 13, 1973. 50 p, 1 tab, 3 map.

Descriptors: *Environmental effects, *Dam construction, *Montana, *Federal government, Land management, Water management(Applied), Dams, Watersheds(Basins), Flooding, Flood control, Sediment control, Erosion control, Watershed management, Runoff, Soil conservation, Water resources development, Rocky Mountain region.
Identifiers: *Environmental Impact Statements, *Administrative regulation, *Baker Lake, Mont.

This project involves construction of a single-purpose floodwater retarding structure and land conservation treatment measures. It is designed to protect the city of Baker and Baker Lake, in southeastern Montana, from floodwater and sediment damage. The region is semiarid and is used primarily for rangeland and oil wells. The watershed includes most of the city. The project will reduce floodwater and sediment damage, enhance opportunities for future reclamation of Baker Lake, reduce sediment production and runoff from the watershed. Some plant species and wildlife habitat will be lost, and the potential hazard of soil waste pollution in the basin will be increased. Alternatives considered were: land treatment along, alternative structural measures, floodproofing, channeling and diking, land use regulation, flood plain insurance, and no project action. Land use patterns are stable and expected to remain unchanged. 185 acres, mostly rangeland, will be irrevokably committed to project use. The public and other governmental agencies generally support the project. (Deckert-Florida)
W74-12601

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE NARROWS UNIT, MISSOURI RIVER BASIN PROJECT, COLORADO, AND FOR OTHER PURPOSES.
Committee on Interior and Insular Affairs (U.S. House).
For primary bibliographic entry see Field 6E.
W74-12609

AUTHORIZING AND PROVIDING FOR CONSTRUCTION OF A WATER DISTRIBUTION SYSTEM AND A WATER SUPPLY FOR THE SOBOBA INDIAN RESERVATION.
Committee on Interior and Insular Affairs (U.S. House).
For primary bibliographic entry see Field 6E.
W74-12612

WATERSHED PROJECTS.
For primary bibliographic entry see Field 4D.
W74-12622

SOWASHEE CREEK WATERSHED, LAUDERDALE COUNTY, MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
Available from NTIS, Springfield, Va. 22161 as EIS-MS-73-1716-F. October 29, 1973. 84 p, 1 tab, 2 map.

Descriptors: *Environmental effects, *Multi-purpose projects, *Federal government, *Mississippi, Water management(Applied), Land management, Dams, Watersheds(Basins), Dam construction, Flooding, Flood control, Sediment control, Channel improvement, Erosion control, Watershed management, Gulf coastal plain, Recreation facilities, Recreation, Reservoir construction, Reservoirs.
Identifiers: *Environmental impact statement, *Administrative regulations, *Meridan, Miss.

This project is to solve problems of erosion, sedimentation, flooding, and inadequate recreational facilities in the Sowashee Creek Watershed. The city of Meridian, Mississippi is particularly affected by this project. The plans call for conservation land treatment measures, single-purpose floodwater retarding structures, a multi-purpose structure for floodwater retardation, channel modifications, and basic recreation facilities. Sheet erosion occurs on most of the land in the watershed. Damaging flooding occurs as often as four times per year in some of the low-lying areas. The project will reduce flooding, erosion, and sediment deposition and will create fishery and waterfowl habitat. The proposed project is the most feasible of the various combinations of the plan's components that were considered. The effects upon long-term use of resources is minimal. While some concern is expressed by various agencies respecting the channel modification called for in the plan, reaction to the program is generally favorable. (Deckert-Florida)
W74-12626

MAP SHOWING DRAINAGE AREAS, WARREN QUADRANGLE, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 7C.
W74-12633

REPORT OF THE RIVER MASTER OF THE DELAWARE RIVER FOR THE PERIOD DECEMBER 1, 1972 - NOVEMBER 30, 1973.
Office of Delaware River Master, Milford, Pa.
U.S. Geological Survey Report, May 1974. 82 p, 3 fig, 1 plate, 19 tab.

Descriptors: *Delaware River Basin Commission, *Delaware River, *Streamflow, *Water management(Applied), Water quality, Monitoring, River basin development.

The twentieth Annual Report of the River Master of the Delaware River covers the year December 1, 1972 to November 30, 1973. The year was generally above normal from a hydrologic standpoint. Precipitation was excessive. The annual flow of Delaware River at Montague, N. J., adjusted for diversions and changes in reservoir storage was about 40% above median and the third highest of record. Intense, heavy rains caused flash floods on streams tributary to the upper Delaware River June 29 and 30. Storage of reservoirs during the year decreased from 76.0% in December, 1972, and on November 30, 1973, the combined storage was 57.0% of capacity. The maximum combined storage during the year was 104.7% of capacity (June 30). The minimum was 57.0% of capacity (November 30). Diversion by New York City did not exceed the legal limit. Diversions through the Delaware and Raritan Canal in New Jersey did not exceed limits. Data are presented showing the extent of salinity invasion and other water-quality characteristics during the report year. The gaging station at Montague continues participation in the Earth Resources Technology Satellite program by transmitting river stage data. Other sites that have been activated monitor water quality data, groundwater elevations, and stream stages. Data is transmitted from the ERTS-1 satellite to Goddard Space Flight Center, Greenbelt, Md., and by landline to the Pennsylvania District Water Resources Center for processing. (Knapp-USGS)
W74-12634

METEOROLOGICAL CRITERIA FOR EXTREME FLOODS FOR FOUR BASINS IN THE TENNESSEE AND CUMBERLAND RIVER WATERSHEDS,
National Weather Service, Silver Spring, Md. Hydrometeorological Branch.
For primary bibliographic entry see Field 2B.
W74-12636

SAVANNAH MUCK DIKES--RESTORATION FEASIBILITY STUDY.
Weaver Enterprises, Waterloo, N.Y.
For primary bibliographic entry see Field 8A.
W74-12638

4B. Groundwater Management

HYDROLOGIC CONSEQUENCES OF USING GROUNDWATER TO MAINTAIN LAKE LEVELS AFFECTED BY WATER WELLS NEAR TAMPA, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. W. Stewart, and G. H. Hughes.
Open-file report 74006, 1974. 67 p, 20 fig, 2 tab, 3 ref.

Descriptors: *Lakes, *Florida, *Surface-groundwater relationships, Withdrawal, Pumping, Infiltration, Water levels, Water level fluctuations, Groundwater movement, Water wells.
Identifiers: *Tampa(Florida).

Extreme declines in lake levels near Tampa, Florida have been forestalled since 1966 at Round Lake and since 1968 at Charles and Saddleback Lakes by pumping water from the Floridan Aquifer into the lakes. Levels are maintained at a nearly constant stage slightly below the altitude at which the lakes begin to overflow and generally above the altitude that the lake levels would have attained naturally. The pumping compensates for the lowering of the water table caused by pumping for public water supply and below-normal rainfall. Combined pumpage into the three lakes averaged 765 gpm during 1971. During 1971, rainfall was about equal to lake evaporation so the water pumped into the lakes was used entirely to replace water that leaked from the lakes into the local aquifer system. Almost all leakage eventually returned to the Floridan Aquifer. The estimated increase in lake evaporation attributable to maintaining the lake levels against the effects of pumping for public water supply and below normal rainfall would have been 25 gpm for the three lakes or 3% of the groundwater input for 1971. Adding groundwater to the lakes caused a distinct change in the chemical quality of the lake water, generally characterized by increases in calcium, bicarbonate, hardness, and alkalinity. However, many lakes in Florida are naturally supplied with the same kind of groundwater; hence, any long-term ecological changes are not expected to be drastic or harmful. Further study will be needed to document whether any long-term ecological changes are likely to occur. (Knapp-USGS)
W74-12013

DEVELOPMENT OF WATER FROM FRACTURED CRYSTALLINE ROCKS, REPUBLIC OF KOREA,
Ministry of Construction, Seoul (Republic of Korea).
J. T. Callahan, and Seung Il Choi.
Reprint of paper presented at the 2nd International Convention on Groundwater (Atti Del 2 Convegno Internazionale Sulle Acque Scotterranee), Palermo, Italy, April 28-May 2, 1973. 20 p, 5 fig, 3 tab, 5 ref.

Descriptors: *Hydrogeology, *Groundwater, *Water resources development, *Fractures(Geologic), Granites, Metamorphic rocks, Water yield, Water wells.
Identifiers: *Korea.

The development of water from crystalline rocks, in the Republic of Korea, has been limited to a relatively few places. Wells were drilled to supplement a few public water supplies in 1960 and 1961 and for the extraction of thermal water at hot springs resorts beginning in the early 1920's. More than 130 water wells were drilled in all types of crystalline rocks from 1966 to 1971. Wells drilled on favorable geologic structures, intersecting joints, fractures, and faults, and solution zones in thin limestone beds have a better change of yielding large volumes of water than those drilled at random sites. The depth of weathering of crystalline rocks and the topographic location appear to influence the sustained yield of wells. Wells in areas of low relief and deep weathering in the western part of the peninsula yield larger volumes of water on a sustained basis than those in the central mountainous areas. Weathering to depths of 25 meters is not uncommon, and weathered zones in granite and schist interbedded with limestone were encountered in wells to depths of more than 60 meters. Based on low-flow measurements of major and minor tributaries in the Han River basin during the dry seasons, individual subbasin groundwater outflow from crystalline rocks ranged from 500 cu m/day to more than 1,000 cu m/day per square kilometer. Streams in basins underlain by granite flowed more consistently than stream underlain by other rock types during periods of drought. The chemical quality of groundwater in crystalline rocks is satisfactory for most purposes. Dissolved solids generally are less than 300 milligrams per liter. (Knapp-USGS)
W74-12018

SOME DATA ON MOVEMENT OF RADIOSTRONTIUM WITH GROUNDWATER CURRENT,
For primary bibliographic entry see Field 5B.
W74-12040

GROUNDWATER RESOURCES OF THE HOLLYWOOD AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
H. W. Bearden.
Open-File report FL-74015, 1974. 71 p, 17 fig, 5 tab, 21 ref.

Descriptors: *Groundwater, *Hydrogeology, *Saline water intrusion, *Florida, Water utilization, Withdrawal, Municipal water, Water quality, Water levels, Drawdown, Transmissivity, Water yield.
Identifiers: *Hollywood(Fla).

Freshwater for all purposes in Hollywood, Florida, is derived from the highly permeable Biscayne aquifer. The aquifer is composed chiefly of permeable beds of limestone, sandstone, and sand that extend from land surface to a depth of about 200 feet. Water levels in the aquifer fluctuate chiefly in response to rainfall, the major source of recharge. The water table slopes gently from the west and averages about 1.0 foot higher in the western part of the city than in the eastern part. The configuration of the water table is greatly influenced by Hollywood Canal and the ocean. Because the permeability of the aquifer is high, the effect of pumping of wells is dispersed over a large area and drawdowns are about 0.1 foot. Saltwater intrusion from Hollywood Canal is the chief threat to the groundwater supply in Hollywood. When discharge is low, the chloride concentration of water in the canal has reached levels greater than 10,000 mg/liter. Saltwater has been detected in the aquifer at depth within 0.1 mile of the municipal wells. Groundwater of good quality is available in the western part of the Hollywood area. Because the transmissivity of the Biscayne aquifer is high, with proper planning additional quantities of water can be obtained without affecting water levels significantly in existing wells. (Knapp-USGS)
W74-12054

WATER RESOURCES OF THE POWDER RIVER BASIN AND ADJACENT AREAS, NORTHEASTERN WYOMING,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12056

GROUNDWATER RESOURCES OF YELLOW CREEK STATE INLAND PORT AREA, TISHOMINGO COUNTY, MISSISSIPPI,
Geological Survey, Jackson, Miss.
E. H. Boswell, and B. E. Wasson.
Yellow Creek State Inland Port Authority, Mississippi, Publication, 1974. 19 p, 1 fig, 1 tab, 9 ref.

Descriptors: *Groundwater, *Water yield, *Mississippi, *Industrial water, Water supply, Aquifers, Water resources development, Industrial plants, Data collections, Hydrologic data.
Identifiers: *Yellow Creek Inland Port(Miss).

At the Yellow Creek State Inland Port Industrial Area, Mississippi, substantial quantities of groundwater are available for industrial use. Test drilling at five sites resulted in successful test wells at two sites. The aquifer is in chert and hydraulically connected gravel. Test pumping indicated that wells capable of yielding about 1 million gallons per day could be constructed at each of the two sites. Water produced by the test wells was soft and contained less than 50 milligrams per liter of dissolved solids. The iron content was less than 0.3 mg/liter and the average pH was 5.5. (Knapp-USGS)
W74-12059

HYDROGEOLOGIC DATA FROM GREELEY, WICHITA, SCOTT AND LANE COUNTIES, KANSAS,
Geological Survey, Garden City, Kan.
L. E. Stullken, E. C. Weakly, E. D. Gutentag, and S. E. Slagle.
Kansas Geological Survey Basic-Data Series Ground-Water Release No 4, 1974. 58 p, 1 fig, 1 plate, 4 tab.

Descriptors: *Basic data collections, *Hydrologic data, *Groundwater, *Kansas, Water wells, Aquifers, Water yield, Data collections.
Identifiers: *Greeley County(Kans), *Wichita County(Kans), *Scott County(Kans), *Lane County(Kans).

Records of 2,012 wells in Greeley, Wichita, Scott, and Lane Counties, Kansas, are presented. Included are 1,901 irrigation, 38 domestic or stock, 40 industrial or public supply, and 33 other wells. Chemical analyses from 133 representative wells are listed in this release. Lithologic logs of 104 test holes also are included. Groundwater withdrawal has increased concurrently with the number of wells in use. The number of irrigation wells in Greeley County increased from about 10 to 212 during 1951-72, the number of Wichita County increased from 70 to 808 during 1951-72, the number in Scott County increased from about 130 to 717 during 1945-72, and the number of Lane County increased from 5 to 164 during 1949-72. Yields to irrigation wells range from 100 to 2,000 gpm from the Ogallala Formation of Pliocene age and from 250 to 1,500 gpm from the alluvium and undifferentiated deposits of Pleistocene age. As much as 1,000 gpm of water may be available to wells in local areas from fractures and solution openings in the Niobrara Chalk. Yields of 30 to 300 gpm may be available from sandstone beds in the undifferentiated rocks (mainly Dakota Formation) of Early Cretaceous age. (Knapp-USGS)
W74-12068

AVAILABILITY OF GROUNDWATER FOR THE U.S. NAVY WELL FIELD NEAR FLORIDA CITY, DADE COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
F. W. Meyer.
Open-file report FL74014, 1974. 50 p, 18 fig, 1 tab, 13 ref.

Descriptors: *Groundwater, *Water yield, *Water resources development, *Military reservations, *Florida, Withdrawal, Analog models, Conjunctive use, Artificial recharge, Saline water intrusion.
Identifiers: *Florida City(Fla).

Enough groundwater is available in southeastern Dade County so that the U. S. Navy facilities at Key West can increase withdrawal from 6 million gallons per day to 18 million gallons per day. It is planned that future water requirements in southeastern Dade County--beyond the 18-million-gallon-per-day demand--be met chiefly by recharge from a pump-equipped conveyance canal for Conservation Area 3. An electrical analog model of the Biscayne aquifer, constructed in cooperation with the Central and Southern Florida Flood Control District was used to predict the effects that increased well-field pumpage would have on water levels. (Knapp-USGS)
W74-12076

FIRST CANADIAN HYDRAULICS CONFERENCE PROCEEDINGS.
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-12087

CONTROL OF SEA WATER INTRUSION BY SALTWATER PUMPING--A MATHEMATICAL MODEL,
MacLaren (James F.) Willowdale (Ontario).
For primary bibliographic entry see Field 5G.
W74-12102

NUMERICAL ANALYSIS OF GROUNDWATER FLOWS,
FENCO, Toronto (Ontario).
G. D. Ransford.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 378-393, 1973. 4 fig, 5 ref.

Descriptors: *Groundwater movement, *Numerical analysis, *Computer programs, *Aquifer testing, *Uplift pressure, Sheet piling, Seepage, Aquifer characteristics, Simulation analysis.

Numerical analysis methods are discussed for analysis of well pumping tests to determine aquifer properties when the pumped discharge is not constant, analysis of flow into a circular sheet pile cofferdam driver into permeable material, and uplift under structures such as gravity dams or caissons, when well points are used for pressure relief. Charny's theorem enables the average uplift across a section to be calculated more readily than the uplift at individual points. The surfaces of the sheet piling and of the excavation within the cofferdam are simulated by ring vortices and by distributed sinks. Computer programs are presented for the problems. The case of a leaky aquifer is treated by evaluating the Hantush and Jacob leaky aquifer function. A computer program is given for drain design. (See also W74-12087) (Knapp-USGS)
W74-12104

THE APPLICATION OF A SIMULATION MODEL TO THE PLANNING AND MANAGEMENT OF WATER RESOURCES IN LANCASHIRE,
Lancashire River Authority (England).
P. D. Walsh.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 56-59, 25-27 September 1973. 1 fig, 2 tab, 3 ref.

Descriptors: *Water resources development, *Planning, *Management, *Simulation analysis, *Computer models, Computer programs, Water supply, Conjunctive use, Hydrologic data, Reservoirs, Sandstone, Aquifers, Rivers, Withdrawal, Operations, Inflow, Wells, Constraints, Systems analysis.
Identifiers: River authorities, Yield.

Several reservoirs and a sandstone aquifer are used conjunctively in a water supply scheme. One of the reservoirs and the aquifer are capable of further development and the yield of the system may be further increased by river abstractions. Described is the simulation model developed to investigate the yield of the scheme and the ways in which the system might be operated. The model accepts 46 years of data; pentad data is used for the reservoir inflows and mean daily flows for the rivers. All system parameters, license conditions and operating policies are specified as data for each run of the model. The program contains a number of output options, enabling different aspects of the system to be examined in detail. Output can be produced on an annual, monthly or daily basis. Through subsidiary programs, frequency analysis, graph plots, or listings of daily results may be produced. In future, this model will study system performance and operation during the construction period when demands on the system might exceed the available supplies. (See also W74-12107) (Bell-Cornell)
W74-12136

HYDRODYNAMICS OF ARTIFICIAL GROUNDWATER RECHARGE,
California Univ., Irvine. School of Engineering.
R. R. Brock.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 831, $4.75 in paper copy, $2.25 microfiche. Completion Report, February 1974. 135 p, 88 fig, 11 tab, 15 ref. OWRT C-3112(3687)(2), 14-31-001-3687.

Descriptors: *Artificial recharge, *Dupuit-Forchheimer theory, *Groundwater recharge, Hydrodynamics, Potential flow, Recharge ponds, *Porous media, Saturated flow, Water spreading, *Water table aquifers, Perched water, Laboratory tests, California, *Groundwater movement, *Leakage.
Identifiers: Perched recharge mounds, Semipervious layers, Sand models, Potential Theory, Strip basin, Square basin.

Ground-water recharge to a horizontal water table and to a semipervious layer were investigated. The saturated flow equations for a homogeneous isotropic medium were used to find theoretical solutions. Experiments were conducted in a laboratory sand model. Field observations of recharge mounds developed beneath square ponds near Fresno, Calif., were also utilized. For the horizontal water-table case the classical Dupuit-Forchheimer (D-F) theory and the more exact potential (P) theory were used. For each theory a linear (L) and nonlinear (NL) version were used. Solutions for a dimensionless water-table rise were obtained using the LDF, NLDF, LP and NLP theories for a strip basin. Most of these were obtained by a finite-difference solution of the equations. For a square basin the LDF and NLDF theory were used. In general it was found that for a shallow flow (which occurs when the ratio of initial depth to basin width is sufficiently small) and small water-table rise the LDGF theory is valid, whereas for larger rises the nonlinear effects are important and the NLDF theory must be used. The laboratory results for shallow flows were in close agreement with the NLDF theory. For deep flows the D-F theories are inadequate and the potential theories must be used. The NLP theory was used to obtain detailed flow patterns for both a shallow and deep flow case. For perched mounds on a semi-pervious layer the NLDF theory was used to develop solutions for the mound shape for strip and square basins. Laboratory expermints for steady state perched mounds beneath a strip basin were conducted in a sand model. For small leakage rates the NLDF theory compares favorably with the experimental results. For large leakage rates the NLDF theory is not adequate, probably because of relatively large vertical velocities. A method was developed to determine the permeabilities of the semi-pervious layer and sand above the layer from observed steady-state mound shapes and recharge rates. The method is illustrated with field data from a square pond.
W74-12195

MULTILEVEL OPTIMIZATION FOR CONJUNCTIVE USE OF GROUNDWATER AND SURFACE WATER,
Case Western Reserve Univ., Cleveland, Ohio. Systems Research Center.
W. Yu, and Y. Y. Haimes.
Water Resources Research, Vol 10, No 4, p 625-636, August 1974. 7 fig, 6 tab, 22 ref, 2 append.

Descriptors: *Conjunctive use, *Systems analysis, *Optimization, Groundwater resources, Surface waters, Water resources, Municipal water, Recharge, Imported water, Irrigation water, Industrial water.
Identifiers: *Regional authority, *Multilevel systems, *Local water agency, Pumping tax, Agricultural demand, Management models, Asymmetrical grid network model.

A general systems analysis approach, not using straight simulation methods, was applied to the problem of optimal conjunctive use of groundwater, local surface water, and imported water resources. A water resources management problem was considered for a hypothetical region composed of several adjoining subregions overlying a common aquifer. The aquifer was represented by a two-dimensional asymmetrical grid network model. Local water agencies had exclusive rights for developing and controlling all water resources in its subregion. Water demands

for each subregion were classified as agricultural or municipaleindustrial. A regional water authority optimally regulated the region's water resources by establishing intersubregional aquifer boundary conditions, and by imposing a pumping tax to pay the cost of recharging the aquifer. The solution was implemented by a completely decentralized decision making structure of two level hierarchy. (Adams-ISWS)
W74-12296

SEEPAGE RATES AND THE HORIZONTAL FLOW APPROXIMATION,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
For primary bibliographic entry see Field 8D.
W74-12297

TRACING SHALLOW GROUNDWATER SYSTEMS BY SOIL TEMPERATURES,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 2F.
W74-12300

WATER QUALITY AND POLLUTION--SOUTH FORK OF LONG ISLAND, NEW YORK,
Wisconsin Univ., Oshkosh. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-12313

DATA FROM CONTROLLED DRILLING PROGRAM IN LEE AND OGLE COUNTIES, ILLINOIS,
Illinois State Geological Survey, Urbana.
P. C. Reed.
Environmental Geology Notes, No 71, August 1974. 40 p, 2 fig, 2 tab, 1 append.

Descriptors: *Illinois, *On-site data collections, *Subsurface investigations, *Groundwater resources, *Basic data collections, Exploration, Drill holes, Rotary drilling, Drillers logs, Sieve analysis, Seismic studies, Groundwater.
Identifiers: Lee County(Ill), Ogle County(Ill), Field data.

Descriptions of the character and sequence of materials and tables listing their relative density, consistency, moisture content, and size analyses were presented for glacial materials sampled and tested as part of a controlled drilling program for groundwater exploration at seven sites in Lee County and one site in Ogle County, Illinois. The results of 16 refraction seismograph profiles and preliminary data from a pumping test at one test-hole site were also given for Lee County. (Humphreys-ISWS)
W74-12317

GHANATS OF IRAN: DRAINAGE OF SLOPING AQUIFER,
Iranian Plan and Budget Organization, Tehran. Technical Bureau.
M. Bybordi.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR3, Proceedings Paper 10785, p 245-253, September 1974. 4 fig, 18 ref, 2 append.

Descriptors: *Alluvial aquifers, *Drainage systems, *Subsurface drainage, *Groundwater, *Irrigation, Darcys Law, Water table, Tunneling, Tunnel construction, Conduits.
Identifiers: *Ghanats, *Iran.

The Ghanats of Iran are one of the oldest systems of water supply in the world. A Ghanat is a subsurface drain that brings mountain groundwater to arid plains by means of a man made gravity flow channel. The estimated 50,000 Ghanats in Iran provide from 1/3 to 1/2 of all irrigation water in the country. Their features and construction methods were described. As a Ghanat behaves like a drain, its dicharge is proportional to the length of its wet part and to the difference of head existing between the axis of the tunnel and the regional water table. The actual complex flow conditions of a Ghanat must be simplified to obtain an approximate solution for the transient water table. A simplified approximate theory based on Darcy's Law was presented and the resulting equations were evaluated in terms of different parameters for two representative cases. (Sanderson-ISWS)
W74-12318

WATER RESOURCES OF WISCONSIN, LAKE SUPERIOR BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12335

WATER RESOURCES OF WISCONSIN-MENOMINEE-OCONTO-PESHTIGO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-12336

GEOHYDROLOGY OF THE PARKER-BLYTHE-CIBOLA AREA, ARIZONA AND CALIFORNIA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2F.
W74-12339

WATER PRICING DURING URBAN DEVELOPMENT,
Pennsylvania State Univ., University Park. Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6C.
W74-12366

ANALYSIS OF ELECTRICAL RESISTIVITY MEASUREMENTS OF SHALLOW DEPOSITS,
Iowa State Univ. of Science and Technology, Ames.
For primary bibliographic entry see Field 8G.
W74-12525

INDUCED INFILTRATION AT THE UNIVERSITY OF CONNECTICUT WELL FIELD,
Connecticut Univ., Storrs.
M. T. Giddings.
M Sc thesis, 1966. 35 p, 9 fig, 1 tab, 20 ref, append.

Descriptors: Rivers, *Groundwater, Underflow, Alluvium, Pump testing, *Induced infiltration, *Connecticut.
Identifiers: *Fenton River(Conn), Outwash, Ice-contact deposits, Recharge boundary.

Flow measurements of the Fenton River made during a 21 day study period suggest that the river loss due to induced infiltration to the adjacent well field varies with the pumpage from the well field. The aquifer unity supplying the well field is composed of alluvium, outwash, and ice-contact deposits. Ground water underflow percolating downvalley through this aquifer unit provides a part of the water pumped from the well field. The balance of the water pumped is supplied by induced infiltration from the Fenton River. Water table levels measured during the study period also show fluctuations corresponding to pumpage fluctuations. Additional pump test data indicate that the Fenton River is a recharge boundary for the aquifer unit. Calculations based on the river loss measured during the 21 day study period indicate that an average of 40% of the water pumped from the University of Connecticut well field is derived from the Fenton River by induced infiltration. The lowering of the water table by pumping the wells located near the river induces the infiltration of river water into the underlying aquifer unit. Induced infiltration at the University of Connecticut well field causes a decrease in the flow of the Fenton River it passes the well field. (Campbell-NWWA)
W74-12529

ANALYSIS OF PUMPING WELL NEAR A STREAM,
Arizona Univ., Tucson.
S. A. Bhatti.
M Sc thesis, 1967. 103 p, 17 fig, 13 tab, 23 ref, 5 append.

Descriptors: *Aquifer characteristics, Streams, *Pump testing, Infiltration, *Drawdown, Salinity, Irrigation, *Groundwater, Specific yield.
Identifiers: *Tube well discharge, Water-logging, Coefficient of transmissibility, Coefficient of storage, Surface water-ground water relationships.

A pumping test was conducted to evaluate aquifer characteristics, the percentage of tube well discharge derived from the stream, and the effective distance to the stream simulated as a fully penetrating plane source of constant head. The formulae are applicable although a natural stream is seldom fully penetrating, because the distance from the stream to an equivalent fully penetrating but imaginary plane source can be calculated. When pumping begins, the tube well contains most of its water from the immediate vicinity, but as the cone of influence expands, it receives a part of its water from the stream until a time is reached when it draws the entire amount of water from the stream. This will of course, depend upon the aquifer characteristics, the tube well discharge, distance of the tube well from stream and the infiltration regimen of the stream. Different methods were used to find the distance of stream equivalent to a fully penetrating plane source, the determination of coefficient of transmissibility and coefficient of storage, and, the amount of water that the tube well intercepts from the stream. (Campbell-NWWA)
W74-12531

CAN FREEZING IMPROVE WELLS IN CONSOLIDATED ROCK AQUIFERS,
Food and Agriculture Organization of the United Nations, Rome (Italy). Land and Water Development Div.
D. J. Burdon.
Johnson Drillers Journal, p 5, May-June, 1974.

Descriptors: Aquifer management, Confined aquifers, Consolidation, Storage capacity, *Groundwater, Fissures(Geologic), Cracks, Expansion joints, Irrigation systems, Irrigation wells, *Freezing, Boreholes, Crystallinization, Fractures(Geologic).
Identifiers: *Consolidated rock aquifers, Joint-fissure systems.

Finding ways to increase aquifer storage capacity and yield from wells that tap consolidated rock aquifers is more necessary than ever in some areas of the world where food production must be constantly increased. Freezing the groundwater within the joints and fissures of jointed-fractured rock has some possibility of attaining these ends. Water expands as it freezes. Use of this means to open up and to extend existing joints and fissures appears to be a new concept. It is suggested that by freezing the groundwater in and around the groundwater extraction structure, the expansion of the water will open up the joints, cracks, and fissures. Even though some reclosing of the joints seems likely, the operation will increase the storage capacity of the rock reservoir around the well and allow more water to be pumped each year. New approaches are required and should be tested. The idea presented appears to merit a further study of existing data and methods, followed by identification and testing of approaches which can be considered likely to yield positive results. (Campbell-NWWA)
W74-12532

THE COST OF GROUNDWATER VS. SURFACE WATER,
Moody and Associates, Meadville, Pa.
J. F. Howard.
Water Well Jornal, Vol 28, No 8, p 35-37, August, 1974.

Descriptors: *Cost comparisons, Groundwater, *Groundwater availability, *Decision making, Management, Cost allocation, Economics, Planning, Programs, Water wells, Drilling, Aquifer testing, Aquifer management, Groundwater resources, *Groundwater potential, Cost-benefit analysis, Distribution systems, Maintenance costs, *Surface waters, Municipal water.
Identifiers: Capital expenditures, Production costs, Financial implementation.

The normal sequence of decision-making involved in planning the development of large volume water supplies needed to meet rising industrial or municipal demands has, in the past, badly underestimated groundwater as a reliable low-cost water resource. The greater visibility, aesthetic appeal, and so-called multiple-use concepts of lakes and surface water bodies combined with an undeserved groundwater reputation for unreliability has produced a general philosophical orientation toward the use of surface supplies by those responsible for determining the best long-term source available. Most of the reputation concerning groundwater unreliability is due to a low level of awareness concerning the groundwater system, its controls, and its advantages on the part of many of those involved in the decision-making process. The question of reliability has risen primarily in those areas where proper utilization of the procedures necessary for accurate evaluation and establishment of well-field management plans have not been employed. The overall advantages of groundwater as a longterm water supply source are overwhelming. A few of the more significant facets are described: total reserves, lower contamination potential, physico-chemical stability of groundwater, cost-benefit considerations. (Campbell-NWWA)
W74-12535

HOW TO DIAGNOSE A THIEF ZONE,
Continental Oil Co., Ponca City, Okla.
For primary bibliographic entry see Field 8G.
W74-12536

FILTRATION OF OILFIELD PRODUCED WATERS,
For primary bibliographic entry see Field 5D.
W74-12539

HYDROLOGY OF RADIOACTIVE-WASTE DISPOSAL AT THE IDAHO CHEMICAL PROCESSING PLANT, NATIONAL REACTOR TESTING STATION, IDAHO,
For primary bibliographic entry see Field 5E.
W74-12546

WHAT EXPLORATION GEOLOGISTS SHOULD KNOW ABOUT POLLUTION,
Texas Univ., Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 5B.
W74-12548

TIDAL FLUCTUATIONS OF WATER LEVELS IN WELLS IN CRYSTALLINE ROCKS IN NORTH GEORGIA,
For primary bibliographic entry see Field 2F.
W74-12551

MAP SHOWING DEPTH TO BEDROCK, HARTFORD SOUTH QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12627

CONTOUR MAP OF THE BEDROCK SURFACE, TARIFFVILLE QUADRANGLE, CONNECTICUT-MASSACHUSETTS,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12628

MAP SHOWING DEPTH TO BEDROCK, OLD LYME QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12629

CONTOUR MAP OF THE BEDROCK SURFACE, GLASTONBURY QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12630

CONTOUR MAP OF THE BEDROCK SURFACE, ELLINGTON QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
For primary bibliographic entry see Field 7C.
W74-12631

MAP SHOWING AVAILABILITY OF GROUNDWATER, WARREN QUADRANGLE, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 7C.
W74-12632

A GROUNDWATER INVESTIGATION OF THE LUMMI INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
D. R. Cline.
Open-File Report, 1974. 66 p, 9 fig, 5 tab, 11 ref, append.

Descriptors: *Groundwater, *Water resources, *Indian reservations, *Washington, Aquifers, Water yield, Water quality, Water supply, Saline water intrusion.
Identifiers: *Lummi Indian Reservation(Wash).

Both fresh and daily groundwater underlie the Lummi Indian reservation, Washington. This water is sometimes stratified, with the freshwater lying above the salty water. Significant quantities of fresh groundwater are found beneath Lummi Peninsula and beneath the western part of the reservation. The yields of wells range from less than 1 to 400 gallons per minute. The two most promising areas for the development of additional groundwater supplies are in the western part of the reservation just southeast of Neptune Beach, and the central part of Lummi Peninsula. Although serious saltwater intrusion has not yet been detected on the reservation, some wells may be showing the first signs of it, such as at Gooseberry Point. There, the chloride content of the water from the two public-supply wells has been slowly increasing, from 24 milligrams per liter in 1968 to 110 milligrams per liter in 1972. The quantity of groundwater withdrawn on the reservation in 1972 was about 41 million gallons, about double that in 1965. The fresh groundwater is generally of good quality. (Knapp-USGS)
W74-12635

GROUNDWATER POLLUTION IN THE VICINITY OF TOLEDO BEND RESERVOIR, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 5B.
W74-12641

APPRAISAL OF OPERATING EFFICIENCY OF RECHARGE BASINS ON LONG ISLAND, NEW YORK, IN 1969,
Geological Survey, Washington, D.C.
D. A. Aronson, and G. E. Seaburn.
Available from Sup Doc, GPO, Washington, D.C. 20402, Price $1.45 (paper cover). Geological Survey Water-Supply Paper 2001-D. 1974. 22 p, 8 fig, 1 plate, 2 tab, 31 ref.

Descriptors: *Artificial recharge, *Storm runoff, *Urban hydrology, *New York, Hydrogeology, Glacial drift, Urban runoff, Infiltration, Clogging, Groundwater movement, Water management(Applied).
Identifiers: *Long Island(NY).

Recharge basins on Long Island are unlined pits of various shapes and sizes excavated in surficial deposits of mainly glacial origin. Of the 2,124 recharge basins on Long Island in 1969, approximately 9% (194) contain water 5 or more days after a 1-inch rainfall. Basins on Long Island contain water because (1) they intersect the regional water table or a perched water table, (2) they are excavated in material of low hydraulic conductivity, (3) layers of sediment and debris of low hydraulic conductivity accumulate on the basin floor, or (4) a combination of these factors. A larger percentage of the basins excavated in the Harbor Hill and the Ronkonkoma morainal deposits contain water than basins excavated in the outwash deposits. A larger percentage of the basins that drain industrial and commercial areas contain water than basins that drain highways and residential areas. Storm runoff from commercial and industrial areas and highways generally contains high concentrations of asphalt, grease, oil, tar, and rubber particles, whereas runoff from residential areas mainly contains leaves, grass cuttings, and other plant material. Differences in composition of the soils within the drainage areas of the basins on Long Island apparently are not major factors in causing water retention. Evaporation does not significantly concentrate the chemical constituents and, therefore, evaporation is not a major mechanism of water disposal from these basins. (Knapp-USGS)
W74-12655

4C. Effects On Water Of Man'S Non-Water Activities

ENVIRONMENTAL IMPACT ANALYSIS: THE EXAMPLE OF THE PROPOSED TRANS-ALASKA PIPELINE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-12011

INTERNATIONAL WORKSHOP ON THE HYDROLOGICAL EFFECTS OF URBANIZATION, WARSAW, 1973.
American Society of Civil Engineers, New York.
ASCE Report to National Science Foundation on International Workshop, January 1974. 61 p. NSF Grant GK-35974.

Descriptors: *Urbanization, *Urban hydrology, *Conferences, *International Hydrological Decade, Research and development, Rainfall-runoff relationships, Climatology, Water quality, Water pollution, Ecology, Environmental effects.

An International Workshop was held by IHD-UNESCO on the Hydrological Effects of Urbanization. The developed countries have already experienced the effects of urbanization on the hydrological cycle, and urbanization of areas is increasing with the likelihood that further damage will be done. There is also evidence that urbanization will increase in the developing countries and that problems will arise there similar to those that have been encountered elsewhere. The effects of

water pollution from large-scale mining operations are comparable to those from industries. Urban areas affect, and are affected by, distant human activities. Among the obvious effects are increased population densities and increased concentrations of residential, industrial and commercial buildings and facilities, with resultant increases in areas that are impervious. Hydrological impacts then include the effects of these changes on the natural drainage, runoff, groundwater, sediment, water quality, water demands, and on measures utilized for the disposal of wastes and surplus water and for the supply of water. Among the hydrological problems associated with urbanization are the continually increasing demands for water for various uses, changes in the physical environment that alter the natural water balance, and the disposal of wastes that may contaminate streams and groundwater. The most important topics for research are changes in surface runoff caused by urbanization; quantity and quality of runoff; soil moisture and groundwater; water demand forecasting; water quality effects related to groundwater; and effects of waste water and sludge on the natural purification capacity of receiving waters and on aquatic life. (Knapp-USGS)
W74-12052

WATER QUALITY AND RELATED STUDIES, JACKSONVILLE AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-12077

ENVIRONMENTAL GUIDELINES FOR DEVELOPMENT ROADS IN THE SUBARCTIC,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5G.
W74-12223

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA, VOLUME 1, REPORT,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 8A.
W74-12340

WATER RESOURCES PROTECTION MEASURES IN LAND DEVELOPMENT - A HANDBOOK,
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 5G.
W74-12352

IMPACT OF FOREST MANAGEMENT PRACTICES ON THE AQUATIC ENVIRONMENT,
Quinault Indian Reservation, Taholah, Wash. Quinault Resource Development Program.
For primary bibliographic entry see Field 5C.
W74-12355

EFFECTS OF CLEAR CUTTING ON WATER DISCHARGE AND NUTRIENT LOSS, BITTERROOT NATIONAL FOREST, MONTANA,
Montana Univ., Missoula. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-12359

BEECH CREEK, MT. VERNON, OREGON, FLOOD CONTROL CHANNEL (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W74-12599

OSWEGO STEAM STATION, UNIT 6, NIAGARA MOHAWK POWER CORPORATION, OSWEGO HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Buffalo, N.Y.
For primary bibliographic entry see Field 6G.
W74-12600

HYDROLOGIC DATA FOR URBAN STUDIES IN THE AUSTIN, TEXAS METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-12653

AN ENVIRONMENTAL REFERENCE FOR THE CONSTRUCTION INDUSTRY,
Indiana Univ., Bloomington. Poplars Research and Conference Center.
For primary bibliographic entry see Field 5C.
W74-12661

4D. Watershed Protection

WATERSHED VALUES IMPORTANT IN PLANNING,
Forest Service (USDA), Franklin, N.C. Southeastern Forest Experiment Station.
J. E. Douglass.
In: Optimizing the South's Forest Resources, Proceedings of the Second Regional Technical Conference, March 11-15, 1974, Houston, Texas, Astroworld Hotel, Texas Forest Service, College Station, p 59-73. 3 fig, 1 tab, 37 ref.

Descriptors: *Land use, Planning, *Water resources development, Water resources, *Water quality, Streams, Runoff, *Stream regimen, Water pollution sources, Water pollution treatment, Watershed protection, *Southeastern U.S.

Forests cover 20 to 65 percent of the land in the major water resource regions of the South, and forest management practices control or regulate the volume and timing of streamflow from these lands. Although water quality is emerging as the major water problem, quality and timing of streamflow will be important and interrelated watershed values which should be considered in land use planning. Protection or improvement of hydrologic performance of forest soils will continue to be an important consideration in planning.
W74-12230

ESTIMATION OF RAINFALL EROSION INDEX,
Engineering-Science, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 2J.
W74-12321

BAKER LAKE WATERSHED PROJECT, FALLON COUNTY, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Bozeman, Mont.
For primary bibliographic entry see Field 4A.
W74-12601

WATERSHED PROJECTS.
Hearings--Subcomm on Conservation and Credit, Comm on Agriculture, U.S. House of Representatives, 93rd Cong, 1st Sess, May 8, 21, and October 30, 1973. 98 p.

Descriptors: *Watershed management, *Federal government, *Flood protection, *Channeling, Water management(Applied), Watersheds(Basins), Flood control, Water control, Channel improvement, Dams, Erosion control, Flood plains, Multiple-purpose projects, Reservoirs, Flood plain zoning, Watershed Protection and Flood Prevention Act, Rivers, Streams, Organizations, Administrative agencies, Governmental interrelations, Soil management.
Identifiers: *Congressional hearings.

Hearings were conducted to obtain general testimony regarding nine watershed projects proposed by the Soil Conservation Service (SCS). The projects primarily enhanced watershed protection and flood prevention. The projects considered were: Bacon Creek, Iowa; Carbon Hill Watershed, Montana; Cow Creek, Oklahoma; Lost Creek, Missouri; Nutwood Watershed, Illinois, Oolenoy River, South Carolina; Prichett Creek, West Virginia; Tallulah Creek, North Carolina; Truth or Consequences-Williamsburg Arroyos, New Mexico. The SCS made detailed presentations, including environmental impact statements, on each of the projects. Statements by interested Congressmen and other officials were also submitted. Representatives of the Environmental Policy Center and Environmental Action voiced opposition to those projects which involved channelization. Environmental Action recommended that flood plain zoning be implemented in all watersheds prior to construction and that the SCS be given authority to veto zoning variances granted even after project completion. While the environmental impact statements prepared by the Department included the adverse ecological effects which would result from certain projects, the statements by the two environmental groups were the only testimony in opposition to any of the projects. (Deckert-Florida)
W74-12622

SOWASHEE CREEK WATERSHED, LAUDERDALE COUNTY, MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-12626

SAND GULLYING IN A SAHELIAN SITE: OBSERVATIONS DURING RECENT RAINFALL IN THE NOUAKCHOTT REGION (MAURITANIA),
Institut Fondamental d'Afrique Noire, Dakar (Senegal). Dept. of Geography.
C. Barbey, and J. Carbonnel.
C R Hebd Seances Acad Sci Ser D Sci Nat. Vol 274, No 22, p 2933-2935. 1972. Illus.
Identifiers: *Erosion, *Gullies, Mauritania, Nouakchott, *Rainfall intensity.

Rainfall intensity was indicated by splashes on Euphorbia up to 25 cm from the soil, and soil moisture at a depth of 10 cm. The shrub vegetation is the principal factor causing streaming. The presence of nebkas, and their density (on the average 1/5 m) promote the concentration of the streaming in the resulting natural channels. This flow canalization partly accounts for the torrential aspect of the ravine forms. The plant cover also influences the types of erosion through the roots. Euphorbia roots act as preferential penetration axes for the percolation water. The fine and diffuse roots of Panicum form resistance islets against streaming. The drooping stems provide extra protection.--Copyright 1973, Biological Abstracts, Inc.
W74-12677

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

ECOLOGY AND ANALYSIS OF TRACE CONTAMINANTS - PROGRESS REPORT, JANUARY 1973-SEPTEMBER 1973.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12021

ENVIRONMENTAL MONITORING OF TOXIC MATERIALS IN ECOSYSTEMS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12023

TOXIC METALS IN SEDIMENTS,
Oak Ridge National Lab., Tenn.
E. A. Bondietti, R. R. Perhac, F. H. Sweeton, and T. Tamura.
In: ORNL-NSF-EATC-6, p 176-194, January 1974. 3 fig, 5 tab, 11 ref.

Descriptors: *Toxicity, *Toxins, Ecology, *Sediments, Analysis, *Assay, Chemicals, Soil analysis, Cadmium, Nickel, Marshes, Wetlands, *New York, Pollutant identification.
Identifiers: *Foundry Cove(NY).

Two distinctly different sediment samples taken from a cadmium- and nickel-contaminated marsh in Foundry Cove, New York, were characterized with respect to chemical forms of cadmium and nickel present. Sediment particle separations using density gradient centrifugation revealed the presence of mixed cadmium-calcium carbonates in the most contaminated sediment (3.9% Cd). The second sediment sample, which had less total cadmium (0.19%) and no CdCO3, contained three times as much exchangeable Cd(2+) as the higher cadmium sediment and maintained approximately the same Cd(2+) concentration in solution. Thus, the availability of cadmium from the two samples may not be in proportion to their total cadmium contents. The results of the characterization study emphasize the necessity for studying chemical forms rather than just total amounts. More than one site is suggested for studies of this type. (See also W74-12021) (Houser-ORNL)
W74-12025

DEVELOPMENT OF HIGH SENSITIVITY X-RAY FLUORESCENCE FOR ANALYSES OF TRACE TOXIC ELEMENTS,
Oak Ridge National Lab., Tenn.
C. J. Sparks, Jr., J. C. Ogle, H. W. Dunn, and L. D. Hulett.
In: ORNL-NSF-EATC-6, p 243-269, January 1974. 7 fig, 3 tab, 8 ref.

Descriptors: *Analytical techniques, *X-ray fluorescence, *Fluorescence, Research and development, Ecology, Environment, *Trace elements, Instrumentation, Design criteria, Spectroscopy.
Identifiers: High sensitivity, *Collimators.

Methods for using x-ray fluorescence for quantitative determination of trace elements in samples of environmental interest are given. Monoenergetic exciting x-rays obtained by using a doubly bent hot-pressed pyrolytic graphite monochromator with a standard x-ray tube and solid-state detector system allow the determination of trace elements to levels of a few parts per million. Geometrical considerations in the design of the x-ray detection collimator system are discussed, and the measurements of the necessary parameters for converting observed fluorescent intensities into quantitative units are described. (See also W74-12021) (Houser-ORNL)
W74-12028

ENVIRONMENTAL APPLICATIONS OF CENTRIFUGAL PHOTOMETRIC ANALYSIS,
Oak Ridge National Lab., Tenn.
G. Goldstein, J. L. Bowling, J. E. Strain, J. M. Dale, and T. R. Mueller.
In: ORNL-NSF-EATC-6, p 270-281, January 1974. 4 tab, 12 ref.

Descriptors: *Analytical techniques, Environment, *Pollutant identification, *Pollutants, Research and development, Analysis, Assay, Evaluation, Instrumentation, Measurement, *Tennessee, *Spectrophotometry.
Identifiers: *Walker Branch Watershed(Tenn).

The purpose is to develop practical analytical methods for analysis of environmental pollutants using the GeMSAEC Fast Analyzer. During this report period a second GeMSAEC analyzer was acquired and instrument development for measurement of light emission signals was essentially completed. A signal amplifier was designed and fabricated, and a light-emitting diode (LED) was installed in place of the tungsten lamp on the second analyzer. A new modified FOCAL compiler was prepared for luminescence measurements and computer programming for implementing spectrophotometric, turbidimetric, and kinetic methods of analysis was completed. Specific methods that were developed are included. (See also W74-12021) (Houser-ORNL)
W74-12029

SEPARATION, DETECTION, AND IDENTIFICATION OF ORGANICALLY BOUND TOXIC METALS AND OTHER HAZARDOUS MATERIALS,
Oak Ridge National Lab., Tenn.
Y. Talmi.
In: ORNL-NSF-EATC-6, p 282-303, January 1974. 5 fig, 5 tab, 18 ref.

Descriptors: *Analytical techniques, Research and development, *Metals, *Toxins, Toxicity, Trace elements, Chemistry, Instrumentation, Laboratories, Mercury, Air pollution, Water pollution, Arsenic, Selenium, Chromatography, *Gas chromatography, Microwaves, *Pollutant identification, Spectrophotometry.

A gas chromatograph-microwave emission spectrometric detector (GC-MES) system has been built and applied to a variety of analytical and physical problems. The sensitivity of the MES detector is affected insignificantly by the molecular structure of the sought compound. Thus the detection limit for (CH3)2Hg, CH3HgCl and C2H5HgCl is 6, 7 and 4 pg, respectively. This system was successfully applied to the analysis of CH3HgCl at various concentration levels in fish tissue. The procedure is significantly simpler than any other, and the relative sensitivity is at the 5 ppb level. The high accuracy, precision, and flexibility provided by this technique are demonstrated in a physical chemistry study made to determine the following subjects: (1) kinetics of the reaction of halogens with CH3HgX, (2) solubility of CH3HgCl in H2O, (3) vapor pressure of CH3HgCl and (4) determination of air/water distribution coefficient for (CH3)2Hg. (See also W74-12021) (Houser-ORNL)
W74-12030

MEASUREMENT OF MOLECULAR ORGANIC CONTAMINANTS IN POLLUTED WATER BY LIQUID CHROMATOGRAPHY,
Oak Ridge National Lab., Tenn.
W. W. Pitt, R. L. Jolley, S. Katz, and G. Jones.
In: ORNL-NSF-EATC-6, p 304-316, January 1974. 3 fig, 2 tab, 11 ref.

Descriptors: Wastes, *Measurement, *Organic compounds, *Water pollution, Research and development, Assay, Absorption, Oxidation, *Chromatography, Evaporation, Ion exchange, Cation exchange, Toxicity, Public health, *Pollutant identification, *Organic wastes.

Trace organic compounds present in natural waters are being separated and identified with the aid of high-resolution liquid chromatography (HRLC). The chromatographic system currently being used is capable of separating and detecting as many as 150 ultra-violet-adsorbing compounds and/or compounds oxidizable with sulfatoceric acid in a single sample. Concentration factors as large as 10(4th) have been obtained with less than 10% loss of dissolved organic carbon using two-stage, low-temperature evaporation preceded by cation exchange to remove inorganic salts. Samples from six chosen sites have been collected, concentrated, and chromatographed. These sites were chosen so as to be representative of various types of natural waters; unpolluted and polluted; small streams, rivers, and lakes, etc. In addition to these, a sample of the sodium humate fraction of a soil extract was chromatographed. (See also W74-12021) (Houser-ORNL)
W74-12031

RAPID 15-N ISOTOPIC-RATIO ANALYTICAL SYSTEM FOR ENVIRONMENTAL SAMPLES,
Oak Ridge National Lab., Tenn.
J. A. Carter, D. R. Matthews, R. L. Walker, and J. R. Walton.
In: ORNL-NSF-EATC-6, p 317-329, January 1974. 4 fig, 5 tab, 11 ref.

Descriptors: *Nitrogen, Measurement, Environment, Sampling, Assay, *Analytical techniques, *Spectrometers, Gases, Chemistry, Chemical reactions, *Radioisotopes, *Pollutant identification.

An analytical system for measuring total nitrogen and its isotopic abundance in a variety of environmental samples has been developed. A reductive pyrolysis system and a directional focusing 6-in. gas mass spectrometer were combined into the analytical system. In the reductive part of the system, nitrogen species are converted to ammonia with an atmosphere of hydrogen in the presence of a heated nickel catalyst. Five percent of the gas stream is split for measuring total nitrogen by a conductivity detector. The ammonia is removed from the gas stream by employing a cold-finger reaction vessel. The hydrogen-free ammonia is decomposed thermally to nitrogen and hydrogen at 1000 C, by using a hot rhenium filament. The N-2 produced from the decomposition is used for measuring the abundance of masses 28 and 29 by mass spectrometry. From this ratio, the N-15 atom fraction is calculated. (See also W74-12021) (Houser-ORNL)
W74-12032

TOXIC MATERIALS INFORMATION CENTER,
Oak Ridge National Lab., Tenn. Environmental Information Systems Office.
For primary bibliographic entry see Field 10D.
W74-12035

THE FLOW OF MERCURY IN SOCIETY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12036

RADIOACTIVE EFFLUENTS FROM NUCLEAR POWER STATIONS IN THE COMMUNITY; DISCHARGE DATA - RADIOLOGICAL ASPECTS.
European Communities, Luxembourg. Commission.
For primary bibliographic entry see Field 5B.
W74-12037

MIGRATION OF RADIOACTIVE STRONTIUM IN THE BIOSPHERE - SOME DATA ON RADIOSTRONTIUM AS A FACTOR IN ENVIRONMENTAL CONTAMINATION,
For primary bibliographic entry see Field 5B.
W74-12039

SOME DATA ON MOVEMENT OF RADIOSTRONTIUM WITH GROUNDWATER CURRENT,
For primary bibliographic entry see Field 5B.
W74-12040

ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1973,
Battelle-Pacific Northwest Lab., Richland, Wash. Occupational and Environmental Safety Dept.
For primary bibliographic entry see Field 5B.
W74-12044

ENVIRONMENTAL MONITORING REPORT FOR SANDIA LABORATORIES FOR 1973,
Sandia Lab., Albuquerque, N. Mex.
For primary bibliographic entry see Field 5B.
W74-12047

LEAK DETECTION IN UNDERWATER OIL PIPELINES,
National Maritime Research Center, Galveston, Tex. Cargo Handling and Terminals Program.
P. A. Jackson.
Available from NTIS, Springfield, Va 22161 as COM-73-11776 Price $3.00 printed copy; $2.25 microfiche. NOAA Report 272-23100-R2, September 1973: 32 p, 14 fig, 1 tab.

Descriptors: *Oil spills, *Monitoring, *Water pollution control, *Leakage, *Instrumentation, Acoustics, Telemetry.
Identifiers: *Leak detection.

Leak detection devices suitable for underwater oil pipelines are discussed. The review includes consideration of leak or crack detection by flow measurement, pressure, ultrasonics, acoustic emission, magnetic flux, visual examination, eddy current, radioactive slugs, electromechanical and electrochemical tapes, doublewalled pipes, coaxial cable, lasers, permeable membranes, and remote sensing. The review was performed to provide appropriate pollution control information prior to the construction of underwater oil pipelines from deep water tanker terminals to shore facilities. It is recommended that a stationary ultrasonic through-the-pipe-wall crack/flow detector be used with a coaxial cable and shroud positioned a short distance above the pipe. (Knapp-USGS)
W74-12065

BAILEY OIL CONTENT MONITOR,
Esso Research and Engineering Co., Floram Park, N.J.
J. O. Moreau, and J. J. Heigl.
Available from NTIS, Springfield, Va 22161 as COM-73-10940, Price $3.00 printed copy; $2.25 microfiche. Final Contract Report to Maritime Administration, April 1973. 88 p, 14 fig, 3 append. Contract No C-1-35049.

Descriptors: *Oil pollution, *Water pollution control, *Monitoring, *Ships, Oil water, Instrumentation, Fluorescence, Fluorometry.

A device to monitor oil in the overboard discharge of ballast water was evaluated. The unit and ancillary equipment items meet shipboard requirements for mechanical rigidity and intrinsic safety. The Bailey Monitor was tested aboard the Esso Scotia. The system is sufficiently sensitive to detect low concentrations of crude oil in water. As a quantitative measuring device, a number of factors affected the accuracy of the system. These included improper calibration and signal saturation effects which can introduce small to major errors in the readings. These errors can be greatly reduced. (Knapp-USGS)
W74-12066

SOLMNEQ: SOLUTION-MINERAL EQULIBRIUM COMPUTATIONS,
California Univ., Berkeley. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 2K.
W74-12086

ASPECTS OF MONITORING AND CONTROL OF WATER QUALITY,
Great Ouse River Authority (England).
R. H. Billington, N. Taylor, and D. C. Young.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 181-208, 25-27 September 1973. 9 fig, 4 tab, 15 equ.

Descriptors: *Water quality control, Computers, *River basins, *Systems analysis, *Data processing, Management, Monitoring, Sampling, Pollutants, Statistics, Simulation analysis, Projects, Mathematical models.
Identifiers: *Great Ouse River basin(England).

Outlined are some simple techniques used in electronic data processing that have been developed for use in the day-day management of water quality within the Great Ouse River Authority area. The routine surveillance scheme in operation there is described. Examples of computer usage are discussed. Considered are a sampling frequency, a pilot study, the processing of water quality, data presentation, management information service, and monitoring. Next, there is a discussion of the more advanced computer-based techniques being developed and used for a systems analysis study of water quality in the Bedford Ouse River basin. Considered are short- and long-term management and operational control of river water quality and the characteristics of existing analytical models, such as the Streeter-Phelps model and Monte Carlo simulation. The limitations of the computer in water resource system planning and management are mentioned briefly. (See also W74-12107) (Bell-Cornell)
W74-12117

COMPUTER ASSISTED QUANTITATIVE SPECTROGRAPHIC ANALYSIS,
Water Research Association, Marlow (England).
R. Crabbe.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 60-62, 25-27 September 1973.

Descriptors: *Water chemistry, Computers, *Water sampling, *Trace elements, Digital computers, Equations, *Water quality control, *Pollutant identification.
Identifiers: *Spectrographic analysis, Quantitative assessment.

Valuable savings have been achieved in time and expense at the Water Research Association by using a computer to perform calculations necessary in the quantitative assessment of trace elements in water samples. This short paper details the method of spectrographic analysis; computing considerations are accounted for. Use of a digital computer is the best and most convenient means of improving speed of calculation. (See also W74-12107) (Bell-Cornell)
W74-12137

BIOLOGICAL METHODS FOR THE ASSESSMENT OF WATER QUALITY (SYMPOSIUM PRESENTED AT THE 75TH ANNUAL MEETING, AMERICAN SOCIETY FOR TESTING AND MATERIALS, LOS ANGELES, CALIF., 26-29 JUNE 1972).
American Society for Testing and Materials, Philadelphia, Pa.
ASTM Special Technical Publication No 528, 1973, J. Cairns, Jr., and K. L. Dickson, editors. 256 p ($16.25).

Descriptors: *Conferences, *Water quality, *Water analysis, *Aquatic organisms, *Bioindicators, *Bioassay, *Analytical techniques, *Pollutant identification, Monitoring, Discharge(Water), Water pollution, Water pollution control, Pollution abatement, Aquatic life, Biochemical oxygen demand, Toxicity, Mixing, Mixolimnion, Effluents, Indicators, Path of pollutants, Quality control, Water management(Applied), Sampling, Laboratories.

The proceedings of an ASTM symposium on the biological assessment of water quality, held June 26-29, 1972 in Los Angeles, Calif., comprise 17 technical contributions by different authors. They deal with the following topics: Interaction of engineers and biologists in water quality management; pollutant bioassay and sampling techniques; internal and external rapid monitoring systems for effluent discharges and polluted receiving streams; mixing zone concepts; BOD tests; the use of fish, algae, diatoms, bacteria, aquatic invertebrates, and other aquatic organisms as pollution indicators; histological and histochemical diagnoses and prognoses of pollutant effects; toxicity tests; and mobile bioassay laboratories. (See W74-12175 thru W74-12191) (Brown-IPC)
W74-12174

INTERACTION OF ENGINEERS AND BIOLOGISTS IN WATER QUALITY MANAGEMENT,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5G.
W74-12175

THE ABC'S OF POLLUTANT BIOASSAY USING FISH,
Guelph Univ., (Ontario). Dept. of Zoology.
J. B. Sprague.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 6-30. 6 fig, 47 ref.

Descriptors: *Bioassay, *Toxicity, *Water pollution effects, *Analytical techniques, *Testing procedures, Fish, Aquatic organisms, Fishkill, Statistical methods, Mixing, Trout, Rainbow trout, Lethal limit, *Pollutant identification.
Identifiers: Sublethal effects, Chronic effects.

A recommended method for testing the acute toxicity of pollutants to fish is described. Among improved procedures advocated are mainly more frequent observations of mortality and use of simple statistical treatment. The four-day lethal concentration or the lethal threshold concentration should be used as final expression of test results. Toxicity curves should be constructed as the experiment progresses, for the information of the investigator. Tests, whether static or continuous-flow, should provide at least 2, preferably 3 liters of test water per gram of fish per day, and should not be aerated. Standard species, such as rainbow trout, are recommended. Effects of mixtures should be assessed by adding toxicant concentrations which have been expressed as fractions of the lethal concentration. Some suggestions are also made for using the standard bioassay technique in studies of sublethal and chronic effects. (See also W74-12174) (Brown-IPC)
W74-12176

MIXING ZONE CONCEPTS,
National Academy of Sciences, Washington, D.C. Environmental Studies Board.
For primary bibliographic entry see Field 5G.
W74-12177

BIOLOGICAL MONITORING OF THE AQUATIC ENVIRONMENT,
Environmental Protection Agency, Cincinnati, Ohio. Analytical Quality Control Lab.
C. I. Weber.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 46-60. 5 fig, 2 tab, 51 ref.

Descriptors: *Water quality control, Waste water(Pollution), *Pollutant identification, *Water pollution, Bioassay, Water analysis, Analytical techniques, Aquatic life, *Monitoring, Federal government, *Data collections, *Sampling, Standards, *Water quality standards, Computer programs, Laboratory tests, Ohio, United States, Aquatic microorganisms, Aquatic organisms, Coordination, Federal project policy.
Identifiers: STORET(Computer program).

A nation-wide water quality monitoring network operated from 1957 to 1968 in Cincinnati by a central Federal laboratory was decentralized in 1968, responsibility for its operation being transferred to regional offices of the Federal Water Quality Administration. An Office of Monitoring was established after creation of the Environmental Protection Agency to provide overall technical coordination of the monitoring program and to standardize methodology and maintain quality control of the data. Four types of monitoring have been identified: ambient trend, source, case preparation, and research monitoring. The monitoring network of the EPA will comprise 5000 to 10,000 EPA-funded stations plus 40,000 to 50,000 stations operated by state and local agencies. Data are to be stored in a central EPA computerized system called STORET. The Analytical Quality Control Laboratory (AQCL) in Cincinnati is charged with responsibility for quality control and for development, validation, and standardization of chemical, microbiological, and biological methods for water and waste water analyses. Biological methodology employed in the EPA's monitoring task deals mainly with sample collection and processing, counting and identification of aquatic organisms, biomass estimation, measurements of bioaccumulation and biomagnification of pollutants, and processing and interpretation of biological data. The QCL conducts research in all areas of biological methods for water quality monitoring, develops reference samples for quality control, and conducts agency-wide interlaboratory methods studies. A biological methods manual was to be prepared and made available in 1973. (See also W74-12174) (Brown-IPC)
W74-12178

BACTERIA AND THE ASSESSMENT OF WATER QUALITY,
Academy of Natural Sciences of Philadelphia, Pa. Dept. of Limnology.
T. L. Bott.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 61-75. 74 ref.

Descriptors: Aquatic bacteria, Aquatic microorganisms, *Bacteria, *Water quality control, *Monitoring, *Bioassay, *Metabolism, *Bioindicators, Indicators, Coliforms, Microorganisms, Biomass, Measurement, Analytical techniques, Testing procedures, Water quality, Sanitary engineering, Water treatment, Waste disposal, Water pollution, Pollution abatement, Water pollution control, Water analysis, Water pollution effects, *Pollutant identification.
Identifiers: Mineralization.

Bacteria are important to water quality evaluations, firstly because certain organisms may be used as pollution indicators, and secondly because bacteria have diverse metabolic capabilities causing the mineralization of substances which other organisms are unable to metabolize. Limitations of widely used coliform procedures are discussed. Some new approaches to the detection of fecal organisms are presented, along with methods for determining bacterial biomass. Measures of bacterial activity are more desirable than biomass estimates, because water quality is affected by the activity of microorganisms. Recent approaches to the direct assessment of bacterial growth and metabolism in natural habitats are outlined. (See also W74-12174) (Brown-IPC)
W74-12179

USE OF ALGAE, ESPECIALLY DIATOMS, IN THE ASSESSMENT OF WATER QUALITY,
Academy of Natural Sciences, Philadelphia, Pa. Dept. of Limnology.
R. Patrick.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 76-95. 7 fig, 1 tab, 41 ref.

Descriptors: Algae, *Bioindicators, Aquatic organisms, *Aquatic algae, *Diatoms, Water quality control, *Monitoring, *Bioassay, Testing procedures, Analytical techniques, Water analysis, *Pollutant identification, Water pollution effects, Laboratory tests, Water quality, Metabolism, Plant physiology, Ecology, Artificial substrates.
Identifiers: Environmental surveys.

Two different approaches to the evaluation of algae as reliable water quality indicators are discussed. One approach involves observation and analysis of natural communities, in which the effect of a pollutant can be estimated by shifts in species composition and structure of the community. The other approach is to study a single species or a few selected species in laboratory cultures under carefully regulated conditions. Such studies are valuable in determining the physiological and morphological changes in function rates and polymorphism due to concentration of a given chemical or physical factor. (See also W74-12174) (Brown-IPC)
W74-12180

USE OF AQUATIC INVERTEBRATES IN THE ASSESSMENT OF WATER QUALITY,
Utah Univ., Salt Lake City. Dept. of Zoology.
A. R. Gaufin.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 96-116, 9 fig, 27 ref.

Descriptors: Water pollution effects, Water pollution control, *Monitoring, *Bioindicators, *Aquatic insects, *Invertebrates, *Bioassay, Testing procedures, Water quality control, Insects, Water pollution, Dissolved oxygen, Biology, Water beetles, Ecological distribution, *Pollution identification, Ecosystems, Aquatic life, Water quality.
Identifiers: Macroinvertebrates, Septic zone.

Since pollution affects primarily living organisms, biological studies of polluted waters have advantages over chemical water analyses: They are less time-consuming and provide a record of prevailing conditions unaffected by temporary effluent alleviations. Earlier studies in Lytle Creek (Ohio) revealed that little reliance can be placed on the mere occurrence of a single species in a given locality as a pollution indicator. The nine most numerous macroinvertebrate species in the septic zone also occurred in the recovery and clean water zones, though in smaller numbers. The septic zone contained less than 20% as many species as the clean zone, but many times the total number of organisms per unit area, namely, species adapted to live in low dissolved oxygen concentrations or capable of securing their oxygen directly from the air. The clean zone contained a variety of organisms intolerant of polluted conditions, mostly gill-breathing immature stages of aquatic flies. As pollution indicators, different organisms must be considered not separately but as biocommunities, i.e., as associated groups with different morphological adaptations and physiological requirements. Several formal systems for biological assessment of pollution from communal compositions have been suggested. A reduction in community diversity has been noted in several rivers polluted by organic wastes. Diversity indices, based on information theory, are highly useful for comparing changes in the community composition of pollution-affected streams. (See also W74-12174) (Brown-IPC)
W74-12181

A TENTATIVE PROPOSAL FOR A RAPID IN-PLANT BIOLOGICAL MONITORING SYSTEM,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
J. Cairns, Jr., R. E. Sparks, and W. T. Waller.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 127-147, 10 fig, 4 tab, 4 ref.

Descriptors: *Bioindicators, *Industrial wastes, *Chemical wastes, *Bioassay, *Monitoring, Toxicity, Fish, *Zinc, *Copper, Copper compounds, Laboratory animals, Water pollution effects, Pollutants, Indicators, Lethal limit, Control systems, Ecosystems, Waste water(Pollution), *Pollutant identification.
Identifiers: Sublethal effects, Zinc compounds.

Preliminary tests are reported for a rapid biological monitoring system which measures changes in the movement and breathing of fish as an early warning of developing toxicity in the waste discharges of an industrial factory. The system provides a continuous assessment of toxicity for comples mixtures varying with time. It was laboratory-tested with simulated spills of Cu and Zn. Fish can detect potentially lethal concentrations of Zn (8 mg/liter) rapidly enough to survive if the Zn is removed at the time of its detection, and also detect sublethal concentrations (2-3 mg/liter). (See also W74-12174) (Brown-IPC)
W74-12183

RAPID BIOLOGICAL MONITORING SYSTEM FOR DETERMINING AQUATIC COMMUNITY STRUCTURE IN RECEIVING SYSTEMS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
J. Cairns, Jr., K. L. Dickson, and G. Lanza.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 148-163, 5 fig, 28 ref.

Descriptors: *Water pollution, *Water pollution effects, *Monitoring, *Bioassay, Ecosystems, *Control systems, *Data processing, Aquatic life, Pollutant identification, Water management(Applied), Analytical techniques, Streams.
Identifiers: Feedback, Sequential Comparison Index, Lasers, Holography, Saprobic system.

Biological monitoring of pollution provides information not available via conventional physical-chemical methods. The saprobic system and the use of structural and functional changes in aquatic communities are two approaches used in assessing the effects of pollutants on aquatic communities. The feedback of information from conventional biological in-stream monitoring has been too slow for the most effective management of an aquatic system. Two rapid biological monitoring systems have been developed to increase the speed of data collection and analysis, viz., the Sequential Comparison Index, and an automated community structure analysis using laser holography. These systems are described as illustrated. (See also W74-12174) (Brown-IPC)
W74-12184

USE OF TOXICITY TESTS WITH FISH IN WATER POLLUTION CONTROL,
Newtown Fish Toxicology Lab. National Water Quality Lab., Cincinnati, Ohio.
C. E. Stephan, and D. I. Mount.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 164-177, 14 ref.

Descriptors: *Bioassay, *Toxicity, Fish, *Water pollution control, *Water pollution effects, *Testing procedures, Lethal limit, Fish populations, Fish behavior, Fish physiology, Pathology, Toxins, Pollutants, Fish conservation, Fish toxins, Taste, Aquatic animals, *Pollutant identification.
Identifiers: Sublethal effects.

The three major functions of applied fish toxicology in water pollution control programs include: (1) to make the best possible decisions regarding the effects of pollution on fish, based on existing data; (2) to make available the additional data most needed for the protection of important fish species; and (3) to evaluate the usefulness of specific toxicity tests and ways of using them to fulfill identified needs and to suggest improved or new tests to be developed. The acute mortality test provides data that are useful in some situations. However, the chronic test (which studies the effects of a toxicant on survival, growth, and reproduction) is probably the most useful test for estimating long-term safe concentrations. Other important adverse effects that should be studied include avoidance, flavor impairment, and accumulation of toxic residues. (See also W74-12174) (Brown-IPC)
W74-12185

ASSESSMENT OF FISH FLESH TAINTING SUBSTANCES,
Environmental Protection Agency, Grosse Ile, Mich. Grosse Ile Lab.
N. A. Thomas.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 178-193, 2 fig, 2 tab, 26 ref.

Descriptors: Fish, *Taste, Fish diets, *Organoleptic properties, *Pollutant identification, *Water pollution effects, Effluents, *Industrial wastes, *Municipal wastes, Discharge(Water), *Ohio River, Ohio, United States, Nutrients, Foods, Testing procedures, Aquatic animals, Fishing, Rivers, Lakes, *Channel catfish.
Identifiers: Sublethal effects.

Increased use of lakes and rivers for sport and commerical fishing in the vicinity of large municipal and industrial effluent discharges has led to the realization that fish in many bodies of water are not palatable. The discharge of organic compounds has contaminated fish flesh to the extent that fishing is curtailed more because of poor eating quality than lack of fish populations. The magnitude of fish flesh tainting was studied, using channel catfish (Ictalurus punctatus Rafinesque) caught in the Ohio River from Pittsburgh, Pa., to Cairo, Ill. An organoleptic panell of fish tasters could differentiate between fish held upstream and downstream from a waste water discharge. Caged fish exposed for 3 days acquired a minimum of 70% of the off-flavor of native fish. (See also W74-12174) (Brown-IPC)
W74-12186

USE OF HISTOLOGIC AND HISTOCHEMICAL ASSESSMENTS IN THE PROGNOSIS OF THE EFFECTS OF AQUATIC POLLUTANTS,
Louisville Univ., Kentucky. School of Medicine.
D. E. Hinton, M. W. Kendall, and B. B. Silver.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 194-208, 23 fig, 30 ref.

Descriptors: Water pollution effects, Water quality, *Toxicity, Fish toxins, *Mercury, *Enzymes, *Bioassay, *Bioinidicators, Animal pathology, Pathology, Biology, Catfishes, *Channel catfish, Fish, Aquatic animals, Heavy metals, Microscopy, Electron microscopy, Analytical techniques, Testing procedures, Monitoring, Pollutants, Fish physiology, *Pollutant identification.
Identifiers: Histology, Histochemistry, Tissues, Sample preparation, Prognosis, *Methyl mercury chloride.

The effects of water pollutants on fish tissues can be evaluated and predicted by histologic and histochemical techniques. These techniques are reviewed and discussed, including sample preparation. Definitions of terms are included. The methodologies involved are illustrated by summarizing studies on the effect of methyl mercury chloride on channel catfish. Alterations in tissue structure and enzyme activity are evident as a result of exposure to low concentrations of heavy metal pollutants. Early alteration in response to aquatic toxins is detectable by electron microscopy in conjunction with enzyme histochemical analyses. The extent of alteration forms the basis for prognoses and thus for the development of reasonable water quality standards. (See also W74-12174) (Brown-IPC)
W74-12187

STABILIZATION OXYGEN DEMAND,
Weston and Stack, Inc., Malvern, Pa.
V. T. Stack, Jr.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 209-220, 7 fig, 3 ref.

Descriptors: *Biochemical oxygen demand, *Oxygen demand, *Bioassay, *Biodegradation, *Organic compounds, Water pollution, *Analytical techniques, *Testing procedures, Organic loading, *Pollutant identification, Microorganisms, Aquatic microorganisms, Standards, Chemical reactions.
Identifiers: Stabilization oxygen demand, Biosynthesis.

The oxygen required for biological stabilization of organic matter is a fundamental parameter in assaying the presence of such biodegradable materials. Comparative results present the status of biological stabilization reactions in natural systems and biological processes. The 5-day BOD test has been used as a limited measurement of the desired data. A stabilization oxygen demand (SOD) technique for more definitive examination of bio-stabilization is being developed by a task force of ASTM Committee D-19 on Water. The analytical technique is based on measurements of energy oxygen utilized in support of synthesis reactions and of the resulting synthesis of microorganisms. Completion of analysis in ca. 1 hr is an objective. The SOD is calculated as the sum of energy oxygen and autoxidation oxygen utilized in the stabilization of synthesized cell material. The synthesis may conceivably be measured by determining changes in ATP (adenosine triphosphate) concentrations. (See also W74-12174) (Brown-IPC)
W74-12188

MICROBIOLOGICAL INHIBITION TESTING PROCEDURE,
Weston (Roy F.), Inc., West Chester, Pa.
P. J. Marks.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 221-226, 2 fig, 1 tab, 2 ref.

Descriptors: *Inhibition, *Microorganisms, Activated sludge, Water pollution effects, *Testing procedures, Analytical techniques, Pollutants, Waste Water(Pollution), *Bioassay, *Waste water treatment, *Biological treatment, Biochemical oxygen demand, Biodegradation, Effluents, Industrial wastes, Inhibitors, Oxidation, Monitoring, Biomass, Metabolism, *Pollutant identification.
Identifiers: Microbiological Inhibition Testing Procedure.

A procedure for determining the potential adverse effects of specific compounds or waste waters on biological treatment processes is described. It involves the monitoring of the oxidation rate of a biological seed at various waste water dilutions in BOD bottles. The threshold inhibition level of a compound or specific effluent is defined as the lowest concentration which causes a reduction in the biological oxidation rate. (See also W74-12174) (Brown-IPC)
W74-12189

USE OF ARTIFICIAL SUBSTRATE SAMPLERS TO ASSESS WATER POLLUTION,
T. W. Beak, T. C. Griffing, and A. G. Appleby.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 227-241, 6 fig, 35 ref.

Descriptors: *Sampling, *Monitoring, Equipment, Benthic flora, Benthic fauna, Water pollution effects, *Artificial substrates, *Bioassay, Periphyton, Invertebrates, Aquatic organisms, Marine biology, Benthos, Marine animals, Marine plants, *Pollutant identification.

Benthic organisms (macro-invertebrates and micro- and macrophytic floral species) are important parts of aquatic ecosystems for measuring the impact of pollution. Artificial substrate samplers provide a means of sampling many locations where other samplers are ineffective. Their historic development and use, and the major types of available apparatus are discussed. Three macroinvertebrate samplers (the rock-filled basket, the multi-plate sampler, and the Beak steel tray) are evaluated critically and compared to results obtained using other methods (Surber sampler, dip net, and Petersen grab). Periphyton samplers usually consist of glass or plastic plates, with differing methods of suspension. Marine intertidal and subtidal communities may be sampled by fiberglass plates bolted to rocks or building blocks. Artificial substrate samplers can obtain an equally diverse fauna with less variability between samples. They are an effective method of biological monitoring and evaluation of water pollution. (See also W74-12174) (Brown-IPC)
W74-12190

MOBILE BIOASSAY LABORATORIES,
Industrial Bio-Test Labs., Inc., Northbrook, Ill.
R. M. Gerhold.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 242-256, 1 tab, 34 ref.

Descriptors: Equipment, *Laboratories, Research facilities, *Bioassay, *Water quality control, *Monitoring, Research and development, Facilities, Measurement, Pollution abatement, Water pollution effects, Aquatic organisms, Sampling, Organizations, Institutions, Organoleptic properties, Toxicity, Pollutants, Water quality standards, Regulation, Water pollution control, Analytical techniques, Testing procedures, Boats, Barges, Tracking techniques.
Identifiers: *Mobile laboratories, Directories, Trailers, Carts, Automotive equipment, Vehicles, Locomotive equipment.

Mobile laboratories with flow-through systems utilize actual receiving waters with their unique physical, chemical, and biological characteristics which are known to influence the toxicity of environmental contaminants. They offer definite advantages over stationary laboratories in collection of data for enforcement of water quality standards, for pest control studies, and for pollution engineering and research. They can also be used to investigate the tainting of edible aquatic organisms by organoleptic methods. A survey of mobile bioassay equipment and a list of organizations using them are provided. The table indicates the

facilities (tractor trailer, house trailer, hospital cart, van, barge, houseboat, two-wheel trailer, self-propelled cab, etc.), the kind of studies performed, the organisms studied, and persons to be contacted for further information. Increasing use for such mobile bioassay laboratories is both recommended and predicted in applied research on pollution monitoring and abatement. Semi-permanent streamside or floating laboratories can also help to gain fundamental knowledge on environmental factors affecting the growth, development, reproduction, and behavior of aquatic organisms which is needed for better understanding of long-term pollution effects. (See also W74-12174) (Brown-IPC)
W74-12191

DETERMINATION OF TRACE METAL POLLUTANTS IN WATER RESOURCES AND STREAM SEDIMENTS,
Dayton Univ., Ohio.
C. R. Cothern.
Available from the National Technical Information Service as PB-235 855 $5.50 in paper copy, $2.25 in microfiche. Ohio Water Resources Center, Columbus, Completion Report 424X, 1974. 182p, 2 append. OWRT B-044-OHIO(1).

Descriptors: *Analytical techniques, *Chemical analysis, Lake Sediments, Radioactive tracers, Organic compounds, *X-ray fluorence, *Trace elements, Surface waters, Plant physiology, *Pollutant identification, *Lake Erie, *Ohio, *Metals, Absorption, *Electron microscopy, *Calibrations, Zinc, Strontium, Cadnium.
Identifiers: Dayton(Ohio), *Great Miami River(Ohio).

Studies were conducted concerning development of the technique of X-ray fluorescence (XRF) and electron spectroscopy for chemical analysis (ESCA) for trace metal analysis. Four independent techniques for quantitatively calibrating an XRF spectrometer were compared showing the most reliable to be the semi-theoretical method. The minimum detectability limit for bremsstrahlung excitation was shown to be of the order of 10 ppm. A new method of peak spectra analysis was developed. It was shown that the K alpha/K beta ratio was constant for normal environmental samples. Also interelement effects were shown to be small for environmental samples. Electron excitation was shown to be a poor alternative to proton excitation. The technique of XRF was used to determine trace element concentration in Lake Erie sediments and water samples from the Great Miami River. This latter study revealed the importance of determining both the dissolved and suspended loads. A method was developed for energy calibrating an ESCA spectrometer for environmental samples. This method was applied to several zinc compounds and used to identify molecular species in sediments. It was shown that ESCA can be applied to both inorganic and organic environmental samples. An approach was developed to calculate the charge on an atom allowing systematic analysis of ESCA spectra. A radioactive isotope tracer technique was used to determine the uptake of Zn, Sr and Cd in buckwheat plants. This study showed synergistic effects between these elements.
W74-12194

EFFECTS OF CADMIUM SALTS ON THE REPRODUCTIVE POTENTIAL OF MALE RAINBOW TROUT AS DETERMINED BY IN-VIVO AND INVITRO TECHNIQUES,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
W. C. Sanford.
Available from National Technical Information Service, Springfield, Va 22161 as PB-235 837 $3.00 in paper copy; $2.25 in microfiche. Oklahoma Water Resources Research Institute, Stillwater Completion Report, (1974). 16 p, 10 fig, 1 tab, 13 ref. OWRT A-042-OKLA(1), 14-31-0001-4036.

Descriptors: *Ultrasonics, *Cultures, *Rainbow trout, Cadmium, Chlorides, Gonads, *Fish reproduction, Growth rates, *Cytological studies, Pollutant identification, Water pollution effects.
Identifiers: *Trypsin, *EDTA, Liebovitz L-15, Adhesive cells, *Cadmium salts.

A new method for dispersing strongly adhesive cells which uses trypsin and EDTA and ultrasonic sound at non-destructive levels, has been applied to cultures of rainbow trout gonad (RTG-2) cells and has yielded monodisperse cells. Cells dispersed with combined chemical and sonic treatment exhibited the same settling and adhesion times as those transferred without ultrasonic treatment. As measured by trypan blue dye exclusion, viability of cells after this isolation technique was 93%. This new method allows 100% recovery of cells from dense cultures, yields monodisperse cells in suspension, and reduces trypsin contact time. Cadmium chloride was added to Liebovitz L-15 medium to give concentrations of 0, 1, 5 and 10 mg CdCl2/1 to determine the effect of Cd on the growth rate and morphology of Rainbow Trout gonad cells. One mg CdCl2/1 had very little effect on the cells with growth rates and morphology equivalent to control cells lacking CdCl2. After 6 days contact with 5 mg CdCl2/1, a depression in growth rate below control levels was observed as well as a morphologic change in cells characterized by decreased substrate adhesion and the formation of thin granular cellular projections. At 10 mg CdCl2/1 a rapid loss of cells occurred with a loss of cellular integrity.
W74-12204

PROCEEDINGS, SYMPOSIUM ON CONTROL OF FINE PARTICULATE EMISSIONS FROM INDUSTRIAL SOURCES.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 829, $13.00 in paper copy; $2.25 in microfiche. Held January 15-18, 1974, San Francisco, California, Sponsored by US/USSR Working Group, Stationary Source Air Pollution Control Technology. Environmental Protection Agency, Report EPA-600/2-74-008, (1974), 775 p.

Descriptors: *Air pollution, *Control, Technology, *Particle size, Particle shape, *Measurement, Filters, *Industrial wastes, *Conferences, Instrumentation, Coagulation, Condensation, *Pollutant identification, Electrophoresis, Waste treatment.
Identifiers: Fabric filters, *Fine particulates, Electrostatic precipitators, Wet scrubbers, Sonic agglomeration, Emissions, Air pollution sources.

Proceedings of the symposium contain papers from US and USSR on the application of conventional technologies for control of fine particles (3 microns and less), new concepts for fine particulate control, advances in measurement techniques, and chemical composition of fine particulates. The theory behind and the application of electrostatic precipitators, wet scrubbers, and fabric filters for removal of fine particulates from stationary sources are covered. New concepts covered include sonic agglomeration, electrically induced agglomeration, coagulation and condensation with utilization of electrophoresis, thermophoresis, and diffissiophoresis. The presently applied particulate mass measurement methods, plume opacity measurement, instruments measuring efficiency of particulate control equipmnet, sampling from high-temperature, reactive, and corrosive gases, measurement of particle size distribution at emission sources are covered in papers on measurement techniques. (EPA)
W74-12208

AN EVALUATION OF TAILINGS PONDS SEALANTS,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5G.
W74-12217

COMPARISON OF GERMANIUM DETECTORS FOR NEUTRON ACTIVATION ANALYSIS FOR MERCURY,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
R. V. Moore, and O. W. Propheter.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-045, $0.55; microfiche from NTIS, Springfield, Va 22161 as PB-235 944 $2.25. Environmental Protection Agency, Technology Series, Report EPA-660/2-74-045, June 1974. 12 p, 3 tab, 2 ref. EPA Project 16ADN 42, Program Element 1BA027.

Descriptors: *Neutron activation analysis, *Mercury, Analytical techniques, *Pollutant identification, Chemical analysis.
Identifiers: *Gamma ray detectors, *Germanium detectors, Low energy photon detectors.

Two types of lithium-drifted, solid-state, germanium detectors were compared for their ability to detect and measure mercury in matrices of different complexity. Compared were (1) a large, coaxial detector with relatively high efficiency and a good peak-to-Compton ratio, and (2) a thin wafer detector, called alow energy photon detector (LEPD), which has a good resolution for low energy photons. In samples with relatively few elements primarily of low atomic number, the large detector is preferred because of its greater counting efficiency. In complex samples containing many elements that interfere with the mercury peak, e.g., samarium, thorium, barium, and tungsten, the detector of choice is the LEPD because of its ability to resolve the gamma photons. The choice of detector for intermediate samples would depend on the quantity of interfering elements present. (EPA)
W74-12220

AN IMPROVED METHYLTHYMOL BLUE PROCEDURE FOR AUTOMATED SULFATE DETERMINATION,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 2K.
W74-12228

A PORTABLE APPARATUS FOR PRESSURE SIEVING BOTTOM SAMPLES,
Southern Illinois Univ., Carbondale. Fisheries Research Lab. and Dept. of Zoology.
For primary bibliographic entry see Field 7B.
W74-12258

MODULARIZED SYSTEMS FOR FIELD ANALYSIS OF PRIMARY PRODUCTION IN CHESAPEAKE BAY,
Academy of Natural Sciences of Philadelphia, Benedict, Md. Benedict Estuarine Lab.
R. S. Mullen, R. S. Shippen, and K. Mountford.
The Progressive Fish-Culturist, Vol 36, No 2, p 119-120, April 1974. 4 fig.

Descriptors: *Primary production, Technology, *Water sampling, On-site data collections, Sampling, Methodology, Dissolved oxygen, Instrumentation, Chlorophyll, *Chesapeake Bay, Dissolved oxygen analyzers, Pollutant identification.
Identifiers: *Chlorophyll measurement, Water sampling apparatus, Chlorophyll extraction.

A modular system to measure primary production under field research conditions is described. Components are (1) water sampler holder, (2) dissolved oxygen analysis kit, (3) chlorophyll extraction kit and (4) sample bottle racks. (Katz)
W74-12268

AN IMPROVED CHEMICAL DELIVERY APPARATUS FOR USE IN INTERMITTENT FLOW BIOASSAYS,
Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab.
For primary bibliographic entry see Field 7B.
W74-12272

THE EMISSION OF BIOGENIC HYDROGEN SULFIDE FROM AMAZONIAN FLOODPLAIN LAKES,
Instituto Nacional de Pesquisas da Amazonia, Manaus (Brazil).
For primary bibliographic entry see Field 5B.
W74-12284

SORPTION OF ORTHOPHOSPHATE ON THE SURFACE OF WATER SAMPLE CONTAINERS,
Agricultural Research Service, Morris, Minn.
J. J. Latterell, D. R. Timmons, R. F. Holt, and E. M. Sherstad.
Water Resources Research, Vol 10, No 4, p 865-869, August 1974. 6 tab, 3 ref.

Descriptors: *Sorption, *Adsorption, *Phosphates, *Phosphorus, Chemical analysis, Phosphorus compounds, Inorganic compounds, Surfaces, Anion adsorption, Phosphorous radioisotopes, Analytical techniques, Spectrophotometry, *Pollutant identification.
Identifiers: *Orthophosphate, Ascorbic acid method, Borosilicate glass containers, Polyethylene containers, Coated galvanized metals, Uncoated galvanized metals, Desorption, Cubitainer, Plicote, Contact time, Radioactive 32P.

Orthophosphate sorption studies on borosilicate glass, polyethylene, and coated and uncoated galvanized metal were reported. The concentration range of orthophosphate in the solutions studied was 0.0075-1.00 ppm P, and the pH range was 5.8-8.8. The exposure of solution to surface ranged up to 14 days, ratios of surface area to milliliters of solution being in the range 0.04-1.14 sq cm/m.l. The percent of the original orthophosphate sorbed was determined by the use of radioactive 32P and by orthophosphate analysis using the ascorbic acid method. Studies indicated that aqueous solutions containing 0.03-0.112 ppm orthophosphate may be stored in either borosilicate or polyethylene bottles with less than 0.5% adsorption during the initial 24-hour storage period. The amount of sorption for a given sample was observed to increase as the contact time and/or the ratio of surface area to solution volume increased. Measurable quantities of orthophosphate were sorbed on galvanized sheet metal in all the studies made, indicating that sample-collecting equipment made of this material should be coated to minimize orthophosphate sorption. Various coatings were tested, and their effectiveness was minimizing sorption is reported. (Henley-ISWS)
W74-12307

PERSISTENCE AND MOVEMENT OF DBCP IN THREE TYPES OF SOIL,
California Univ., Davis. Dept. of Nematology.
For primary bibliographic entry see Field 5B.
W74-12310

WATER QUALITY AND POLLUTION--SOUTH FORK OF LONG ISLAND, NEW YORK,
Wisconsin Univ., Oshkosh. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-12313

DATA ON SELECTED LAKES IN WASHINGTON, PART II,
Geological Survey, Tacoma, Wash.
G. C. Bortleson, G. T. Higgins, and G. W. Hill.
Available from Washington State Dept. of Ecology, Olympia, Price $3.00 per copy. Washington State Department of Ecology, Olympia, Water-Supply Bulletin 42, June 1974. 145 p, 69 fig, 7 tab, 52 ref, append.

Descriptors: *Lakes, *Washington, *Limnology, Eutrophication, *Surveys, *Data collections, *Hydrologic data, Nutrients, Algae, Thermal stratification, Dissolved oxygen.

Twenty-three lakes in Washington were investigated to determine their present trophic status and evaluate their potential for nutrient enrichment from cultural and natural sources. The lake basins vary from relatively undisturbed forest land to urban and suburban land, with lakeshore homes numbering from none to more than 50 homes per mile of shoreline. The mean depth--probably the most significant morphometric parameter affecting lake productivity--was rather shallow (12-25 ft) in about two-thirds of the lakes investigated. The midsummer dissolved-oxygen profiles of most lakes show saturation or slight supersaturation in the epilimnion, and low oxygen content (often depleted) in the hypolimnion. The observed specific-conductance values during winter mixing ranged from 10 to 145 micromhos per centimeter. The specific conductance for about 40% of the lakes was fairly low (10-50 micromhos per centimeter). The mean total phosphorus concentration in the photic zone throughout the year ranged from 3 to 108 micrograms per liter; the median value was 16 micrograms per liter. The mean inorganic nitrogen (ammonia plus nitrate) concentration in the photic zone throughout the year ranged from 50 to 980 micrograms per liter; the median value was 180 micrograms per liter. Algal blooms were observed at least once on 9 lakes; persistent algal blooms were observed on 3 lakes. The bottom area occupied by submergent rooted aquatic plants ranged from 0.2% to 34% of the total bottom area, and the water surface occupied by emergent and (or) floating rotted aquatic plants ranged from less than 0.01% to 9.4% of the lake surface area. The lakes with the more abundant macrophyte growth contained a higher percentage of muck in the littoral zone, while lakes with less abundant macrophyte growth contained a higher percentage of coarse sand, gravel and cobbles in the littoral zone. (See also W73-10654) (Knapp-USGS)
W74-12341

EFFECTS OF RESIDUAL TOXINS IN OIL REFINERY EFFLUENTS ON AQUATIC ORGANISMS,
Oklahoma State Univ., Stillwater. Water Resources Research Inst.
For primary bibliographic entry see Field 5C.
W74-12348

FREEZE CONCENTRATION OF TOXIC POLLUTANTS FOR BIOASSAY,
Oregon State Univ., Corvallis. Water Resources Research Inst.
F. D. Schaumburg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 911, $3.25 in paper copy, $2.25 in microfiche. Completion Report, July 1974. 24 p, 1 fig, 1 tab, 19 ref. OWRT A-018-ORE(1).

Descriptors: Chlorides, *Dieldrin, *Bioassay, Freezing, Toxicity, Toxins, Pulp wastes, Chemical analysis, *Pollutant identification, Water pollution effects.
Identifiers: *Methylmercuric chloride, *Freeze concentration process.

A freeze concentration process was investigated as a possible method whereby sub-lethal concentrations of toxic substances in aqueous solution could be quantitatively concentrated for analysis by standard acute toxicity tests. Excellent chemical recoveries were obtained for a sodium chloride control sample; however, two toxic substances, methylmercuric chloride and dieldrin were not concentrated quantitatively. A dilute sample of kraft pulp mill effluent was also freeze-concentrated and evaluated by chemical analysis. Bioassays using newborn guppies were undertaken on unconcentrated and freeze-concentrated solutions of dieldrin. These experiments revealed that the freezing process did not alter the toxic nature of the compound. In general, the results showed that the freeze concentration method is not a feasible approach for concentrating dilute samples for acute toxicity analysis.
W74-12349

ATOMIC ABSORPTION DETERMINATION OF NANOGRAM QUANTITIES OF ARSENIC IN BIOLOGICAL MEDIA,
Washington Univ., Seattle. Dept. of Environmental Health.
R. M. Orheim, and H. H. Bovee.
Analytical Chemistry, Vol 46, No 7, p 921-922, June, 1974. 4 fig, 1 tab, 13 ref.

Descriptors: *Arsenic, *Spectroscopy, *Analytical techniques, *Organic matter, Laboratory tests, Testing procedures, Instrumentation, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy.

An improved method is described for the preparation of organic samples and a sensitive procedure for arsenic analysis using a single-beam atomic absorption spectrophotometer. An arsine generator and collection train was assembled from standard laboratory glassware. The sample was digested with HCl, KI, $SnCl_2$, and zinc and arsenic generated was trapped in tubing immersed in liquid nitrogen. Aqueous standards containing 0 to 500 ng of arsenic were analyzed by the arsine generation procedure. The precision of nine replicate runs of 100 ng of arsenic was within 5%. Quantitative recovery of namogram amounts of added arsenic from whole blood has been demonstrated with accuracy varying from 95 to 105%. The single beam atomic absorption spectrometric procedure is essentially linear to 100 ng of arsenic with a useable curve to 500 ng. (Jernigan-Vanderbilt)
W74-12479

ANALYSIS OF BACKGROUND COPPER CONCENTRATION IN SEAWATER BY ELECTRON SPIN RESONANCE,
Kansas State Highway Commission, Topeka. Planning and Development Dept.
Y. P. Virmani, and E. J. Zeller.
Analytical Chemistry, Vol 46, No 2, p 324-325, February, 1974. 2 fig, 11 ref.

Descriptors: *Copper, *Sea water, *Analytical techniques, Testing procedures, Separation techniques, Solvents, *Pollutant identification.
Identifiers: *Electron spin resonance.

A technique was tested which makes possible the rapid analysis of the copper concentration in seawater in ranges as low as 0.1 ppb. The system makes use of Electron Spin Resonance (ESR) combined with concentration enhancement by chelation and solvent extraction. Copper can be observed as ESR in the aqueous phase. A concentration of 0.1% 8-hydroxyquinoline was tested in various organic solvents such as ethyl propionate, 3-propanone, ethyl acetate, butyl ether, methyl isobutyl ketone, and cyclophexene. Ethyl propionate was the most satisfactory solvent for the seawater extractions. A plot of samples of seawater spiked with copper indicates a background value of 2.6 ppb Cu in the seawater. The total error of plus or minus 0.2 ppb arose from error in the spectrometer itself and error in the extraction system. (Jernigan-Vanderbilt)
W74-12482

OCCUPATIONAL EXPOSURE TO INORGANIC COMPOUNDS OF LEAD,
Institute of Occupational Health, Zabrze (Poland). Dept. of Industrial Toxicology.
H. Urbanowicz.
Archives of Environmental Health, Vol 23, No 4, p 286-288, October, 1971. 1 fig, 3 tab, 12 ref.

Descriptors: *Inorganic compounds, *Urine, Lead, Human physiology, Distribution, Analytical techniques, Average, *Industrial wastes, Correlation analysis, Adaptation, Lethal limit, *Air pollution effects.

Identifiers: Sub-lethal effects.

A group, initially of 60 persons, was subjected to mild occupational exposure to lead during a period of two years' work in a new smelter. These men, under medical surveillance in an area in which the concentrations of lead in the air were determined at multiple sites on a bimonthly schedule, provided specimens of urine, also bimonthly, at the end of four hours of work on a morning shift. Urine was analyzed for content of lead, delta-aminolevulinic acid, and coproporphyrin. The data, are not sufficiently revealing to provide suitable criteria for the appraisal of the severity of the exposure in relation to the danger of its continuance. (Rowe-Vanderbilt)
W74-12483

DETERMINATION OF ZINC AND NICKEL BY CHARGED PARTICLE ACTIVATION ANALYSIS,
Texas A and M Univ., College Station. Dept. of Chemistry.
D. L. Swindle, and E. A. Schweikert.
Analytical Chemistry, Vol 45, No 12, p 2111-2115, October, 1973. 4 fig, 4 tab, 21 ref. NSF (GP-34877X).

Descriptors: *Zinc, *Nickel, *Analytical techniques, Chemical reactions, Heavy metals, Copper, Cobalt, *Testing procedures, Irradiation, Trace elements.
Identifiers: *Activation analysis.

Procedures for the sub-ppm determination of zinc and nickel have been developed using charged particle activation analysis. Reactions with protons, deuterons, helium-3, and helium-4 beams on thick Zn and Ni targets have been investigated. The most favorable reactions for Zn and Ni analysis were the Zn-66(p,n)Ga-66 and the Ni-58(p,pn)Ni-57 reactions, respectively. A series of samples was analyzed with zinc or nickel contents ranging from 500 to less than 1 ppm, utilizing a post-irradiation chemical separation of the product nuclides. Results from thick target experiments indicate that both Zn and Ni determinations can be made at the ppb level. Activation curves (relative excitation functions) for the reactions used for analysis, as well as possible interfering reactions, are presented and discussed. (Jernigan-Vanderbilt)
W74-12484

DETERMINATION OF MERCURY AND SELENIUM IN COAL BY NEUTRON ACTIVATION ANALYSIS,
North Carolina State Univ., Raleigh. Dept. of Nuclear Engineering.
J. N. Weaver.
Analytical Chemistry, Vol 45, No 11, p 1950-1952, September, 1973. 4 fig, 1 tab, 6 ref.

Descriptors: *Mercury, *Selenium, *Coal, *Analytical techniques, *Neutron activation analysis, X-rays, Research and development, Trace elements, Heavy metals, Tracers, Testing procedures, Equipment.

The procedure described was an optimization of the technique of neutron activation analysis (NAA) and the utilization of a newly developed nuclear detector known as the Low Energy Photon Detector (LEPD). Although originally intended for charged particle analysis, research has shown (LEPD) to be quite promising as a partner with instrumental NAA based on X-ray identification of certain trace metals in irradiated materials. The identification of mercury was especially attractive because of the high cross section for production of the Hg-197 isotope, its 65-hr half-life and the strong intensity of several X-rays and a low energy gamma associated with its decay. Selenium (Se-75), with a 120-day half-life, was easy to identify using two low-energy gamma-rays. The method described for the determination of mercury and selenium in a variety of matrices including coal and fly ash achieves three significant improvements over currently used procedures. The procedure has no chemical manipulations, thereby eliminating technique-related errors. The procedure is based on the direct measurement of the X-rays from irradiated matrices, thus allowing the same technique to be used on a wide variety of matrices. (Jernigan-Vanderbilt)
W74-12485

METALLIC POLLUTANTS MONITORED BY ATOMIC ABSORPTION.
Water and Sewage Works, Vol 119, No 6, p 56-57, June, 1972. 1 tab.

Descriptors: *Heavy metals, Trace elements, Pollutants, *Analytical techniques, *Spectroscopy, Sewage treatment, Monitoring, Copper, Chromium, Calcium, Nickel, Zinc, Lead, Arsenic, Toxicity, Public health, *North Carolina, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy, Charlotte(NC).

The implementation of an atomic absorption monitoring operation in Charlotte, North Carolina to determine the concentrations of heavy metals in the water supply is discussed. Daily analyses of samples taken from three waste treatment plants were used to establish 'normal' levels of copper, chromium, calcium, nickel, zinc, and lead in the sewer system. The program included sampling industrial wastes from about 450 companies issued permits to use the city sewage system. (Jernigan-Vanderbilt)
W74-12486

BERYLLIUM.
Environment, Vol 16, No 3, p 35-36, April, 1974, 2 ref.

Descriptors: *Beryllium, *Toxicity, *Human pathology, Public health, Industrial plants, Metals, Standards, Research priorities, *Air pollution effects, Pollutant identification.
Identifiers: Occupational health.

Beryllium can have both acute and chronic effects. On the acute side it can produce skin ulcers, ocular ulcers, and respiratory tract inflammation, all of which are reversible if exposure is ended in time. The chronic effects of beryllium, frequently separated by years from the time of exposure, usually include pneumonitis with a cough, chest pain and general weakness. Heart, spleen and kidney problems may also appear. The safe exposure level for workers is not known. In 1949, working with a minimum of data, an Atomic Energy Commission panel set the limit of 2 micrograms/cu m of air. Since that time little research has been done and the level remains the same, although it is not and has never been met by industry. Still it has had some effectiveness because since the 1949 AEC standard was instituted, there has been a decline in the incidence of beryllium disease. Research is now oriented toward discovering a possible immunological basis of beryllium disease, which would indicate that some people are much more susceptible than others and showing evidence of beryllium's carcinogenicity. (Jernigan-Vanderbilt)
W74-12487

TRACE METALS IN ASBESTOS CARCINOGENESIS,
Wayne State Univ., Detroit, Mich. Dept. of Occupational and Environmental Health.
A. K. Roy-Chowdhury, T. F. Mooney, Jr., and A. L. Reeves.
Archives of Environmental Health, Vol 26, No 5, p 253-255, May, 1973. 5 tab, 14 ref. 2-RO-1-EC-00240-6.

Descriptors: *Metals, *Asbestos, *Analytical techniques, Spectroscopy, Methodology, Laboratory tests, Public health, Industrial wastes, *Trace elements, *Pollutant identification, *Air pollution.
Identifiers: Carcinogenic.

Concentrations of trace metals judged potentially carcinogenic were determined in samples of amosite, crocidolite, and chrysotile. The samples included commercial material as shipped, milled and processed material as collected in animal exposure chambers, and International Union Against Cancer (UICC) reference samples. The metals determined were cobalt, nickel, chromium, manganese, and iron. The samples were treated with hydrofluoric acid, the residue taken up with hydrochloric acid, and the determination made by atomic absorption spectrometry. Substantial enrichment of the dusts in nickel and chromium during milling and dissemination was found. Cobalt and nickel content was different from that in UICC samples. (Rowe-Vanderbilt)
W74-12488

RESPONSE OF CYANIDE ION SELECTIVE MEMBRANE ELECTRODES IN THE PRESENCE OF METAL IONS,
Rome Univ., (Italy). Instituto di Chemica Analitica.
M. Mascini, and A. Napoli.
Analytical Chemistry, Vol 46, No 3, p 447-449, March, 1974. 4 fig, 9 ref.

Descriptors: Measurement, *Cyanide, *Metals, Chemical reactions, *Analytical techniques, Testing procedures, Cadmium, Zinc, Nickel, Aqueous solutions, *Ions, *Pollutant identification.

The presence of cations was studied and general equations were derived, taking into account the influence of any cyanide complexes on the response of selective membrane electrodes. The measurements were carried out by using iodide, bromide, and chloride electrodes Sens-ion AMEL, made of a heterogenous membrane of silver halide and polythene molded to a polythene; the reference electrode was a double junction SCE filled with KN03 M. The solutions of the metal ions were added to the cyanide solutions. The value of pH was measured with a glass electrode and was regulated between 6 and 8 with NH03 or NaOH. The properties of these electrodes are discussed. (Jernigan-Vanderbilt)
W74-12489

DETERMINATION OF CHROMIUM IN BIOLOGICAL SAMPLES USING CHEMILUMINESCENCE,
Georgia Univ., Athens. Dept. of Chemistry.
R. T. Li, and D. M. Hercules.
Analytical Chemistry, Vol 46, No 7, p 916-919, June, 1974. 2 fig, 6 tab, 21 ref. NIH (GM-17913).

Descriptors: *Chromium, *Analytical techniques, *Organic matter, Chemical reactions, Standards, Testing procedures, Laboratory tests, Human physiology, Spectroscopy, Colorimetry, Distribution, *Pollutant identification.
Identifiers: *Chemiluminescence.

The application of chemiluminescence to the determination of chromium in biological samples as part of a larger program of applying chemiluminescence methods to biological systems was reported. NBS standard reference materials, orchard leaves and bovine liver were used to check the validity of the method. Neither material had a 'certified' value reported for Cr; orchard leaves have an uncertified value of 2.3 ppm. Chromium analyses were done on human serum samples and compared with literature data. Pooled serum samples were analyzed by chemiluminescence, atomic absorption and colorimetric methods to compare the three methods. The three methods showed good agreement generally. The results demonstrated that the chemiluminescence method, based on light emission catalyzed by Cr (III) in the luminol-hydrogen peroxide reaction, is applicable to the analysis of chromium in biological media with greater selectivity and using smaller samples. (Jernigan-Vanderbilt)

W74-12496

CHARACTERISTICS OF BACTERIOPLANKTON OF THE URAL RIVER IN THE ORENBURG REGION, (IN RUSSIAN),
Gosudarstvennyi Meditsinskii Institut, Orenburg (USSR). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-12497

X-RAY PHOTOELECTRON SPECTRA OF LEAD OXIDES,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
K. S. Kim, T. J. O'Leary, and N. Winograd.
Analytical Chemistry, Vol 45, No 13, p 2214-2218, November, 1973. 3 fig, 1 tab, 29 ref. NAS (GP-37017X) AFOSR (AFOSR-72-2238).

Descriptors: *Lead, *Oxides, *X-ray spectroscopy, *Analytical techniques, Inorganic compounds, Oxygen, Crystals, Electrochemistry, *Pollutant identification.

X-ray photoelectron spectroscopy (ESCA) spectra of seven different lead-oxygen species were examined including adsorbed oxygen on lead, two crystal forms of PbO, Pb304, Pb02, and two forms of adsorbed water on Pb02. The spectrum of Pb304 exhibited the behavior of two PbO molecules and one PbO2 molecule although specific characterization of the crystal structure of PbO in Pb304 could not be made. The binding energies of the Pb 4f electrons in Pb02 were found to be lower than those of the Pb 4f electrons in PbO. The apparent reversal was rationalized in terms of a relaxation effect. Two kinds of adsorbed water were also found on PbO2. These were explained in terms of a surface adsorbed water species and a water or hydroxyl species which occupied lattice vacancies near the surface. These spectra were then used to characterize electrochemically generated PbO2. (Jernigan-Vanderbilt)
W74-12498

ELECTRON SPECTROSCOPY (ESCA): USE FOR TRACE ANALYSIS,
Georgia Univ., Athens. Dept. of Chemistry.
D. M. Hercules, L. E. Cox, S. Onisick, G. D. Nichols, and J. C. Carver.
Analytical Chemistry, Vol 45, No 11, p 1973-1975, September, 1973. 2 fig, 12 ref. NSF (GP-32484).

Descriptors: *Spectroscopy, *Trace elements, *Analytical techniques, Heavy metals, Laboratory tests, Testing procedures, Filters, *Pollutant identification.
Identifiers: *Electron spectroscopy.

Glass surfaces coated with the dithiocarbamate group were used to analyze for trace quantities of heavy metals. This type of surface was produced by treating glass fiber with an amino functional silylizing reagent and subsequently with carbon disulfide and sodium hydroxide to form the dithiocarbomate which is capable of reacting with heavy metals as a chelating agent. Application of various chelating functional groups to glass fiber surfaces can be accomplished by conventional synthetic organic techniques once the initial silylising function has been attached. Electron spectroscopy sensitivities are comparable for most elements. Therefore, combining the scope of conventional chelate chemistry, the ease of synthesis of chelating functional groups and the wide applicability of ESCA as a measuring device, the electron spectroscopy-glass fiber disk technique appears to be one of very general utility. (Jernigan-Vanderbilt)
W74-12499

DETERMINATION OF TRACE ELEMENTS IN COAL, FLY ASH, FUEL OIL, AND GASOLINE-A PRELIMINARY COMPARISON OF SELECTED ANALYTICAL TECHNIQUES,
National Environmental Research Center, Research Triangle Park, N.C. Quality Assurance and Environmental Monitoring Lab.
D. J. Von Lehmden, R. H. Jungers, and R. E. Lee, Jr.
Analytical Chemistry, Vol 46, No 2, p 239-245, February, 1974. 6 tab, 8 ref.

Descriptors: *Analytical techniques, *Trace elements, *Spectroscopy, *Mass spectrometry, Mercury, Beryllium, Lead, Cadmium, Arsenic, Manganese, Chromium, Statistical analysis, *Pollutant identification, *Air pollution.
Identifiers: Laboratory comparisons.

The Environmental Protection Agency has initiated a program to monitor trace elements in fuels and related emissions to the atmosphere. As part of this program, nine laboratories using similar analytical methods were asked to determine the concentration of 28 elements in the same fuel and fly ash matrices. Among the elements investigated were mercury, beryllium, lead, cadmium, arsenic, vanadium, manganese, chromium, and fluorine. The analytical methods used included neutron activation analysis, atomic absorption, spark source mass spectrometry, optical emission spectrometry, anodic stripping voltammetry, and X-ray fluorescence. The results from the inter-laboratory comparison were evaluated to assess the comparability of various methods as applied to these matrices. The wide range in reported concentrations indicates that different sample preparation and analytical techniques can lead to erroneous results and points out the need for developing standard reference materials certified in trace elements which can be used for analytical methods evaluation and quality control. (Jernigan-Vanderbilt)
W74-12500

DETERMINATION OF SOLUBLE CADMIUM, LEAD, SILVER, AND INDIUM IN RAINWATER AND STREAM WATER WITH THE USE OF FLAMELESS ATOMIC ABSORPTION,
Illinois State Water Survey, Urbana.
A. Rattonetti.
Analytical Chemistry, Vol 46, No 6, p 739-742, May, 1974. 2 fig, 4 tab, 12 ref. AEC-1199 and USBR 14-06-D-7197.

Descriptors: Rain water, Streams, *Analytical techniques, *Spectroscopy, *Heavy metals, *Cadmium, *Lead, *Silver, Laboratory tests, Testing procedures, Toxicity, Instrumentation, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy, *Indium.

Using stream water and rainwater, this study found interferences in the direct determination of: (1) the environmentally hazardous metals, cadmium and lead, and (2) silver and indium, metals which are used in meteorological research. How the interferences were eliminated in flameless atomic absorption tests is described. The precision of triplicate determinations was plus or minus 5% when the amount of analyte dispensed on the heater ribbon was ten times the absolute detection limit. Argon purging, temperature for drying the sample and volatilization, solvent extraction and additives to keep ions in solution were investigated to cut down on interferences. (Jernigan-Vanderbilt)
W74-12501

LOSSES OF TRACE CONCENTRATIONS OF CADMIUM FROM AQUEOUS SOLUTION DURING STORAGE IN GLASS CONTAINERS,
Idaho Univ., Moscow. Dept. of Chemistry.
W. G. King, J. M. Rodriguez, and C. M. Wai.
Analytical Chemistry, Vol 46, No 6, p 771-773, May, 1974. 3 fig, 8 ref.

Descriptors: *Cadmium, *Aqueous solutions, Storage, *Adsorption, Pollutants, Tracers, Laboratory tests, Testing procedures, *Trace elements, *Pollutant identification.

This study was undertaken to determine the magnitude of as well as the mechanism for the loss of cadmium from water samples stored in various containers. Losses of cadmium in solutions of different concentration and pH were measured with respect to time. Radioactive Cd-109 (half-life 470 days) was employed as a tracer for this study. Losses of cadmium from aqueous solution during storage appeared to depend upon at least three parameters: container material, pH of solution, and concentration of cadmium. (Jernigan-Vanderbilt)
W74-12502

METAL CONTAMINATION OF URBAN WOODY PLANTS,
Yale Univ., New Haven, Conn. School of Forestry and Environmental Studies.
For primary bibliographic entry see Field 5B.
W74-12506

ATOMIC ABSORPTION PROCEDURE FOR ANALYSIS OF METALS IN ATMOSPHERIC PARTICULATE MATTER,
Arizona Univ., Tucson. Dept. of Chemistry.
L. E. Ranweiler, and J. L. Moyers.
Environmental Science and Technology, Vol 8, No 2, p 152-156, February, 1974. 1 fig, 4 tab, 14 ref.

Descriptors: *Analytical techniques, *Spectroscopy, *Metals, Sampling, Trace elements, *Testing procedures, *Air pollution, Filters, *Pollutant identification.

A procedure has been developed for the multielement analysis of atmospheric particulate matter by atomic absorption spectrometry. Atmospheric particulate samples are collected on polystyrene filters using hi-vol samplers. The filters are dry ashed at 400-425C and the residue is dissolved with a mixture of HF, HCl, and HNO3 in Teflon acid digestion bombs. With the appropriate dilutions and matrix corrections, it is possible quantitatively to measure 22 metals in atmospheric particulate matter. The elements measured by this procedure are Si, Al, Ca, Fe, K, Na, Mg, Pb, Cu, Ti, Zn, Sr, Ni, V, Mn, Cr, Rb, Li, Bi, Co, Cs, and Be. Although it is possible to observe Cd in samples collected and prepared by this technique, it is probable that Cd is partially volatilized during ashing of the sample. Recovery data for the ashing and dissolution of synthetic samples added to the filter material are presented. Data are also presented for the atmospheric concentration of elements in particulate samples analyzed by this procedure. (Jernigan-Vanderbilt)
W74-12508

MERCURY CONCENTRATION IN THE WATER, SEDIMENTS AND FAUNA OF AN AREA OF THE TYRRHENIAN COAST,
Siena Univ. (Italy). Inst. of Comparative Anatomy.
For primary bibliographic entry see Field 5B.
W74-12509

'NORMAL' LEAD AND CADIUM CONTENT OF THE HUMAN KIDNEY,
Veterans Administration Hospital, Birmingham, Ala. Trace Metals Lab.
For primary bibliographic entry see Field 5C.
W74-12517

INDICATOR SPECIES IN THE DESMID STAURASTRUM,
Connecticut Univ., Storrs. Inst. of Water Resources.
F. R. Trainor.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 059; $3.00 in paper copy, $2.25 in microfiche. Completion Report, 1974. 10 p, 5 tab. OWRT A-047-CONN(1). OWRR 14-31-0001-3807.

Descriptors: *Bioindicators, Aquatic algae, *Cultures, *Growth rates, Phosphorus, Carbon dioxide, Pollutant identification.
Identifiers: *Staurastrum, *Desmid, *Axenic culture, Defined inorganic medium, Buffers.

A Staurastrum sp. has been cultured for the first time in uni-algal, bacteria-free culture in a defined, low salts, inorganic medium. Carbon dioxide was found to be a limiting factor for the organism's growth in axenic laboratory culture. Glycylglycine (80 mg/100 ml) was found to be an effective buffer, counteracting the acid pH levels created by carbon dioxide bubbling. The lack of sensitivity of Staurastrum growth rates to small changes in phosphate concentration made this organism a poor indicator of the nutrient condition of natural waters. (deLara-Connecticut)
W74-12597

OIL/WATER INTERFACE DETECTOR LABORATORY EVALUATION,
Esso Research and Engineering Co., Florham, N.J.
J. J. Heigl.
Available from NTIS, Springfield, Va 22161 as COM-74-10120, Price $4.00 printed copy; $2.25 microfiche. Final Contract Report EE.11TRM.73, Maritime Administration, 1973. 90 p, 18 fig, 3 tab, 26 ref, 2 append. C-1-35049.

Descriptors: *Pollutant identification, *Oily water, *Instrumentation, *Oil spills, Conductivity, Resistivity, Acoustics, Water pollution, Ships, Pollution abatement.

For measuring oil-in-water in tanker operation, three devices were tested. The devices were based on acoustic attenuation, sonic velocity, and electrical conductivity. None of the devices, as supplied by the manufacturers, could meet the desired performance. The electrical conductivity device was insensitive to changes in oil concentration in the 0 to 1% oil range. The sonic attenuation device gave outputs which increased with oil content in the 0 to 1% range but sensitivity varied widely and it was not possible to get reproducible results. The sonic velocity device was more sensitive but was affected by variations in specific gravity, salinity and impurities and required control of temperature and pressure. (Knapp-USGS)
W74-12637

AIR POLLUTION FROM FUEL COMBUSTION IN STATIONARY SOURCES.
Processes Research, Inc., Research Triangle Park, N.C. Industrial Planning and Research.
For primary bibliographic entry see Field 5G.
W74-12640

THE DETERMINATION OF OIL SLICK THICKNESS BY MEANS OF MULTIFREQUENCY PASSIVE MICROWAVE TECHNIQUES,
Naval Research Lab., Washington, D.C.
J. P. Hollinger.
Available from NTIS, Springfield, Va. 22161 as AD-771 376, Price $3.50 printed copy, $2.25 microfiche. Interim Report No 7110-1 to US Coast Guard, June 15, 1973. 68 p, 38 fig, 1 tab, 21 ref. USCG Contract Z-70099-2-21881.

Descriptors: *Oil spills, *Oily water, *Remote sensing, *Microwaves, *Pollutant identification, Radar.

The thickness and volume of sea surface oil spills was studied using multifrequency microwave radiometry. Aircraftborne measurements were made at 19.3 and at 31.0 or 69.8 GHz of eight controlled marine oil spills. The spills consisted of from 200 to 630 gallons of either No. 2 fuel oil or No. 4 or No. 6 crude oil. The microwave measurements of all of the oil spills of each oil type showed very similar results. The slicks always formed an identifiable region with film thicknesses of a millimeter or more and containing the majority of oil which was surrounded by a very much larger and thinner slick which contained very little of the oil. In general the thick region contained more than 90% of the oil in less than 10% of the area of the visible slick. It was always possible to locate and delineate the thick region solely from the microwave observations. The total volume of oil present derived from the microwave measurements was within about 25% of the volume of oil spilled. Microwave radiometry should prove a useful tool in the confinement, control, and clean up of marine oil spills. (Knapp-USGS)
W74-12644

BIOASSAY DILUTER CONSTRUCTION,
Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.
H. W. Jackson.
Available from NTIS, Springfield, Va. 22161 as PB-224 436, Price $6.50 printed copy, $2.25 microfiche. Training Manual EPA-430/1-73-007, June 1973. 84 p, 18 plates, 7 tab, 4 append.

Descriptors: *Bioassay, *Equipment, Water pollution, Chemical analysis, Laboratory tests, Bioindicators, *Training, *Publications, Pollutant identification.

This manual is designed to supplement tutorial instruction and published literature describing the design and construction of various types of flow-through bioassay and biomonitoring equipment. Illustrations, tables of design values, list of materials needed, and reprints of significant publications from technical journals are included. (Knapp-USGS)
W74-12646

WATER QUALITY CRITERIA 1972, A REPORT OF THE COMMITTEE ON WATER QUALITY CRITERIA.
National Academy of Sciences-National Academy of Engineering, Washington, D.C. Environmental Studies Board.
For primary bibliographic entry see Field 5G.
W74-12674

RESEARCH NEEDS IN WATER QUALITY CRITERIA, 1972.
National Academy of Sciences-National Academy of Engineering, Washington, D.C. Environmental Studies Board.
For primary bibliographic entry see Field 5G.
W74-12675

BIOGEOCHEMISTRY OF THE RARE-EARTH ELEMENTS IN AQUATIC MACROPHYTES OF LINSLEY POND, NORTH BRANDFORD, CONNECTICUT,
Pittsburgh Univ., Pa. Dept. of Biology.
U. M. Cowgill.
Geochim Cosmochim Acta. Vol 37, No 10, p 2329-2345. 1973. Illus.

Descriptors: Trace elements, Aquatic plants, Effects, Vegetation effects, Environmental effects, *Connecticut, X rays.
Identifiers: Aluminum, Ceratophyllum-demersum, Cesium, Decodon-verticillatus, Dysprosium, Erbium, Lanthanum, Macrophytes, Nuphar-advena, Nymphaea-odorata, Pontederia-cordata, Potamogeton-crispus, Potamogeton-praelongus, Praseodymium, Rare-earth, Samarium, Spectroscopy, Ytterbium, Yttrium, Neodymium.

Aquatic plants (Nymphaea odorata, Nuphar advena, Potamogeton praelongus, P. crispus, Ceratophyllum demersum, Pontederia cordata, Decodon verticillatus), water, lake mud, soils and rocks from Linsley Pond (Connecticut) were analyzed for all the naturally occurring elements of the periodic table which could be detected by optical and X-ray emission spectroscopy. In the course of this study, it was noted that all the rare earths of even atomic number were detected; of the odd-numbered members of the group only La and Pr were found. The others were presumably present in amounts below detection. These elements relative to their concentration in the soils and rocks of the basin are absorbed by plants, giving an enrichment of about 100-fold relative to Al on a dry weight basis. Samarium is present in excess of Nd in the rooted emergent plants but not in the submerged rooted or rootless ones. There is some suggestion of a fractionation of the rare earths in different parts of the plants. A comparison of the relative accumulation of trace elements with their content in the sediment suggests that Y, La, Ce, Pr, Sm, Dy, Er and Yb may be essential trace elements.--Copyright 1974, Biological Abstracts, Inc.
W74-12687

AUTOMATED GAS CHROMATOGRAPHIC ANALYSIS OF SULFUR POLLUTANTS,
Varian Aerography, Walnut Creek, Calif.
R. E. Pecsar, and C. H. Hartmann.
J Chromatogr Sci. Vol 11, No 9, p 492-502. 1973. Illus.

Descriptors: *California, *Pollutant identification, Analytical techniques, *Flame photometry, Pulp and paper industry, Oil industry, Electric power industry, Fossil fuels, *Gas chromatography, Chromatography, Chemical analysis, *Air pollution, *Sulfur.
Identifiers: *San-Francisco Bay.

The analysis of sulfur-containing pollutants is becoming mandatory in operations such as kraft paper mills, fossil burning power generation and the petrochemical refining industry. Gas chromatography is a versatile tool for accomplishing this analysis in the normal ppb to ppm concentration range. Typically an all-Teflon flow system is employed with detection by flame photometry. Results are presented showing individual component as well as total system optimization. This includes consideration of column technology, detector gas flow rates and electrical operating parameters. The best column fabrication means are discussed with methods for achieving optimum column and detector operation. For the low level analysis of sulfur pollutants the importance of design attention to the entire system is stressed. The practical application of all these considerations is demonstrated with monitoring data obtained on industrial stationary sources in the San Francisco Bay Area. An analyzer embodying the desired characteristics can be mated with an automated sequence programmer to provide continuous analysis and intermittent calibration completely unattended.--Copyright 1974, Biological Abstracts, Inc.
W74-12690

COXSACKIEVIRUS B EPIDEMIC AT A BOYS' SUMMER CAMP: ISOLATION OF VIRUS FROM SWIMMING WATER,
Vermont Univ., Burlington.
H. B. Hawley, D. P. Morin, M. E. Geraghty, J. Tomkow, and C. A. Phillips.
Jama J Am Med Assoc. Vol 226, No 1, p 33-36. 1973. Illus.

Descriptors: Lakes, Water sports, *Recreation facilities, Camping, *Viruses, Diseases, Swimming, *Vermont.
Identifiers: *Lake Champlain, Coxsackievirus, Enteroviruses, Picornavirus, Polyelectrolyte 60.

During an outbreak of coxsackievirus B5 at a boys' summer camp located on Lake Champlain,

virus was successfully isolated for the 1st time from a large body of recreational water. This was accomplished by using polyelectrolyte 60 to concentrate the virus. Polyelectrolyte 60 was also used in the isolation of viruses from clinical specimens obtained from campers and staff who had a wide variety of clinical syndromes. Virus present in lake swimming water may play in important role in some enterovirus outbreaks.--Copyright 1974, Biological Abstracts, Inc.
W74-12698

APPLICATION OF THE FISSION-TRACK TECHNIQUE TO THE DETERMINATION OF URANIUM IN NATURAL WATERS,
Kyushu Univ., Fukuoka (Japan). Dept. of Chemistry.
T. Takebayashi, H. Matsuda, and S. Umemoto.
Talanta. Vol 20, No 9, p 892-895. 1973.

Descriptors: *Analytical techniques, *Uranium radioisotopes, *Radiochemical analysis, Evaporation, Rivers, *Natural streams, *Pollutant identification.
Identifiers: Fission-track analysis, *Japan, Uranium.

A procedure for the determination of the U content of natural waters is presented. To 100 ml of natural water, 200 ml of concentrated HCl are added and this solution passed through a 6-ml column of Dowex 1-X8. The U is eluted with 60 ml of 0.1 M HCl and the eluate is evaporated to dryness. The residue is subjected to the fission-track technique described previously. The U content of the river waters in Fukuoka City, Japan was determined.--Copyright 1974, Biological Abstracts, Inc.
W74-12720

CLASSIFICATION AND COMMUNITY STRUCTURE OF MACROBENTHOS IN THE HAMPTON ROADS AREA, VIRGINIA,
Virginia Inst. of Marine Science, Gloucester Point.
D. F. Boesch.
Mar Biol (Berl). Vol 21, No 3, p 226-244, 1973. Illus.

Descriptors: *Benthos, *Virginia, *Aquatic plants, Benthic fauna, Water pollution, Mud, Sands, *Classification.
Identifiers: Macrobenthus.

Benthic macrofauna was sampled by grab at 16 stations in Hampton Roads and the adjacent Elizabeth River, Virginia, USA. Samples were taken in Feb., May and Aug. Sampling sizes and species were grouped by a classification strategy which basically consisted of the Canberra metric dissimilarity measure and flexible and group average clustering. Following reallocations, 8 site groups and 16 spp. groups instructively classified the 47 sites and 93 spp. considered in the analysis. The sites were grouped into 'associations' on mud, muddy-sand and sand-bottoms and those in the Elizabeth River. Species groupings distinguished a few species most frequent at Elizabeth River or mud and muddy-sand sites, larger numbers of species restricted to muddy-sand and sand or solely to sand sites, ubiquitous species, epifaunal species which were microhabitat-restricted and seasonal species. An analysis of numerically dominant species in the different associations indicated the relative importance of ubiquitous species and seasonally abundant species. Community structure statistics (species diversity, species richness and evenness) showed difinite spatial and temporal patterns. Diversity was high at sand and muddy-Sand sites and low at mud and Elizabeth River sites. This spatial pattern was predominantly one of species richness. At Elizabeth River and mud stations, diversity increased from Feb.-Aug. because of increased evenness, while at sand and muddy-sand stations, diversity peaked in May in response to both high species richness and high evenness. The applicability of community concepts, the causes of substrate specificity, seasonality and species diversity and the effects of pollution on community structure are discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-12727

5B. Sources Of Pollution

METABOLISM OF COMPONENTS OF EXTENDED AERATION ACTIVATED SLUDGE,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12001

SURFACE-WATER INVESTIGATIONS ON THE LUMMI INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4A.
W74-12008

ECOLOGY AND ANALYSIS OF TRACE CONTAMINANTS - PROGRESS REPORT, JANUARY 1973-SEPTEMBER 1973.
Oak Ridge National Lab., Tenn.
Available from NTIS, Springfield, Va 22161 as Rept No ORNL-NSF-EATC-6, $10.60/copy, $2.25/microfiche. Report No ORNL-NSF-EATC-6, January 1974. W. Fulkerson, W. D. Shults, and R. I. Van Hook, editors. 450 p, 84 fig, 70 tab, 246 ref. NSF AG 389.

Descriptors: Toxicity, *Assessment, *Trace elements, *Environmental effects, *Effluents, *Measurement, *Abatement, *Water pollution control, Transport depletion, Ion transport, Model studies, Radiation, Environment, Ecology, Ecosystems, Analytical techniques, Information exchange, Data collections, Management.

This is the second progress report of the Oak Ridge National Laboratory Ecology and Analysis of Trace Contaminants Project sponsored by the Environmental Aspects of Trace Contaminants Program of NSF/RANN. The objective is to develop techniques and information which will be useful in assessing the environmental impact of toxic trace substances and in reducing discharges of these materials. The work is not specific to any one trace contaminant, but much of the effort to date has been focused on toxic elements. The research involves five areas: (1) development of a Unified Transport Model for trace contaminants, (2) ecological research to characterize the translocation and accumulation of trace elements in the environment, (3) measurements research to improve analytical efficiency and capability, (4) development of aqueous abatement technology, and (5) information flow and management. (See W74-12022 thru W74-12036) (Houser-ORNL)
W74-12021

DEVELOPMENT OF A UNIFIED TRANSPORT MODEL FOR TOXIC MATERIALS,
Oak Ridge National Lab., Tenn.
A. A. Brooks, R. D. Ellison, D. E. Fields, D. D. Huff, and R. J. Luxmoore.
In: Report No ORNL-NSF-EATC-6, p 43-92, January 1974. 15 fig, 3 tab, 41 ref.

Descriptors: *Model studies, *Hydrologic models, *Sediment transport, *Settling, Velocity, *Deposition(Sediments), *Ion exchange, Movement, *Path of pollutants, Soils, Soil moisture, Absorption, Transpiration, Chemical reactions, Streams, Air pollution, Fallout, Infiltration, Transfer precipitation(Atmospheric), Environmental effects, Public health, Watershed management, Ecosystems, Simulation analysis, Missouri, Tennessee.
Identifiers: Walker Branch Watershed(Tenn), Bear Creek Watershed(Tenn), Crooked Creek Watershed(Mo).

The purpose of the Unified Transport Model (UTM) is to simulate the movement of a trace contaminant in a watershed ecosystem. Such simulation should be useful in interpolating monitoring data throughout the watershed and in extrapolating behavior over time. The model calculates the input of contaminants from atmospheric sources and the subsequent movement of these with water (and with water-transported solids) in the watershed. During this reporting period the air model was merged with a modified version of the Wisconsin Hydrological Transport Model. Work is in progress to properly account for chemical exchange and to biological translocation. The UTM (or components thereof) is being tested at the ORNL Walker Branch Watershed, at the TVA Bear Creek Watershed, and in collaboration with the University of Missouri at Rolla at the Crooked Creek Watershed in the New Lead Belt of southeastern Missouri. (See also W74-12021) (Houser-ORNL)
W74-12022

ENVIRONMENTAL MONITORING OF TOXIC MATERIALS IN ECOSYSTEMS,
Oak Ridge National Lab., Tenn.
S. H. Anderson, A. W. Andren, C. F. Baes, III, G. J. Dodson, and W. F. Harris.
In: ORNL-NSF-EATC-6, p 95-139, January 1974. 9 fig, 17 tab, 39 ref.

Descriptors: *Monitoring, Environment, Toxicity, *Toxins, *Trace elements, *Water pollution, *Radioisotopes, Ecosystems, Litter, Rain, Groundwater, Groundwater pollution, Ion exchange, Food chains, Cadmium, Chromium, Copper, Nickel, Lead, Zinc, *Tennessee.
Identifiers: *Walker Branch Watershed(Tenn).

Preliminary trace-element budgets have been developed for the terrestrial components of Walker Branch Watershed. Of all ecosystem components, the litter layer is most important in accumulating trace elements in this system. A preliminary input/output budget for trace elements through Walker Branch has been constructed and includes trace elements in rainfall, dryfall, throughfall, groundwater, and stream flow. Of the trace metals brought in through rainfall, 8% Cd, 26% Cr, 3.7% Cu, 6.6% Ni, 20.8% Pb, and Zn are removed in dissolved form by stream flow. The input/output measurements required development of some new analytical techniques because of the very low levels of trace elements in rainfall. Because of experience with high molecular weight amines as solvent extractants, these materials were tried and successfully used in concentrating trace elements in the various aqueous samples. (See also W74-12021) (Houser-ORNL)
W74-12023

ECOLOGY OF TOXIC METALS,
Oak Ridge National Lab., Tenn.
B. G. Blaylock, E. H. Curtis, R. A. Goldstein, J. W. Huckabee, and C. S. Matti.
In: ORNL-NSF-EATC-6, p 140-175, January 1974. 9 fig, 5 tab, 20 ref.

Descriptors: *Toxicity, *Toxins, *Trace elements, Ecology, *Mercury, *Cadmium, Movement, *Path of pollutants, Ecosystems, Absorption, Transfer, Soils, Fish, Vegetation, Litter, Food chains.
Identifiers: *Methylmercury.

The objective was to determine the fate of toxic metals in the environment and to provide data for predicting their movement and concentration in different ecosystems. Fish from the Great Smoky Mountain National Park were analyzed for methylmercury and total mercury in order to obtain background levels of mercury for comparison with polluted areas. Approximately 93% of the mercury in these fish was methylmercury. Terrestrial studies compared the movement of cadmium and mercury in an old-field ecosystem. These studies showed that mercury or cadmium entering

a terrestrial ecosystem from the atmosphere would be transferred rapidly to the soil. The transfer of these elements from vegetation and litter to soil is linear through time. Radiotracer techniques and stable chemical analyses were used in food-chain studies and to determine the influence of temperature and concentration on the methylmercury uptake in fish. (See also W74-12021) (Houser-ORNL)
W74-12024

TOXIC METALS IN SEDIMENTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12025

ZONAL CENTRIFUGATION: APPLIED ASPECTS IN ELUCIDATING CHEMICAL AND BIOLOGICAL FORMS, DISTRIBUTION AND AVAILABILITY OF HEAVY METALS IN THE ENVIRONMENT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-12026

HYDROLYTIC BEHAVIOR OF TOXIC METALS,
Oak Ridge National Lab., Tenn.
R. E. Mesmer, and C. F. Baes, Jr.
In: ORNL-NSF-EATC-6, p 222-239, January 1974. 2 fig, 3 tab, 33 ref.

Descriptors: *Metals, *Ion exchange, Behavior, *Equilibrium, *Hydrolysis, Research and development, Zinc, Mercury, Copper, Beryllium, Lead, Cadmium, Tin, Arsenic, Antimony, Bismuth, Boron, Scandium, Aluminum, *Chemical reaction.

The sequence of equilibrium reactions of a metal ion with water to form hydroxy complexes is referred to as its hydrolysis behavior. The chemical literature on such behavior for the ions of ten originally selected elements (Zn, Hg, Cu, Be, Pb, Cd, Sn, As, Sb, and Bi) has been critically reviewed. The scope of the project has now been broadened to cover all the metals of the Periodic Table to make available this essential information for all the metallic contaminants encountered from the many diverse industries and sources. Brief summaries of the conclusions drawn for the last five of the above list and also some expressions describing equilibrium behavior for the Group III elements--B, Sc, and Al, are presented. (See also W74-12021) (Houser-ORNL)
W74-12027

DEVELOPMENT OF HIGH SENSITIVITY X-RAY FLUORESCENCE FOR ANALYSES OF TRACE TOXIC ELEMENTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12028

ENVIRONMENTAL APPLICATIONS OF CENTRIFUGAL PHOTOMETRIC ANALYSIS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12029

SEPARATION, DETECTION, AND IDENTIFICATION OF ORGANICALLY BOUND TOXIC METALS AND OTHER HAZARDOUS MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12030

MEASUREMENT OF MOLECULAR ORGANIC CONTAMINANTS IN POLLUTED WATER BY LIQUID CHROMATOGRAPHY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12031

RAPID 15-N ISOTOPIC-RATIO ANALYTICAL SYSTEM FOR ENVIRONMENTAL SAMPLES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12032

RECOVERY OF TOXIC METALS FROM INDUSTRIAL EFFLUENT SOLUTIONS BY SOLVENT EXTRACTION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-12033

ELECTROCHEMICAL RECOVERY OF REDUCIBLE INORGANIC POLLUTANTS FROM AQUEOUS STREAMS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-12034

TOXIC MATERIALS INFORMATION CENTER,
Oak Ridge National Lab., Tenn. Environmental Information Systems Office.
For primary bibliographic entry see Field 10D.
W74-12035

THE FLOW OF MERCURY IN SOCIETY,
Oak Ridge National Lab., Tenn.
W. E. Clark.
In: ORNL-NSF-EATC-6, p 407-409, January 1974. 2 tab, 1 ref.

Descriptors: *Surveys, *Data collections, *Mercury, *Census, Waste disposal, Sites, Wastes, Toxins, Environment, Federal government.
Identifiers: *Usages.

The information from questionnaires sent to various government agencies covering mercury usage during 1971 was compiled and a final report has been prepared. The conclusions are as follows: Twenty-three major agencies of the U.S. Government were questioned relative to the quantities of mercury used, usage patterns, amounts recovered and recycled, and final disposal practices. Of these major agencies eight reported negligible usage, twelve submitted essentially complete questionnaires, two submitted limited response, and one promised a limited response which has not been received. Six hundred and seventy-nine responses were obtained from individual sites or subagencies. A breakdown of usage per agency is given. (See also W74-12021) (Houser-ORNL)
W74-12036

RADIOACTIVE EFFLUENTS FROM NUCLEAR POWER STATIONS IN THE COMMUNITY; DISCHARGE DATA - RADIOLOGICAL ASPECTS.
European Communities, Luxembourg. Commission.
Available from NTIS, Springfield, Va 22161 as NP-19910; $4/copy, $2.25/microfiche. Rept No NP-19910, November 1972. 38 p, 12 tab, 20 ref.

Descriptors: *Monitoring, *Radioactivity, *Effluents, *Nuclear powerplants, *Data collections, *Discharge measurement, Gases, Aerosols, Iodine, Liquids, Tritium, Water, Potable water, Surface waters, *Europe.

Literature data for 1969, 1970, 1971 on radioactive waste discharges from the nuclear power stations in the European Community are presented. In the case of gaseous effluents a distinction is drawn between noble gases, aerosols and iodine-131, and in the case of liquid effluents between the total activity (excluding tritium) and tritium alone. The discharge data are compared with the discharge limits for the various power stations. In addition, for the liquid effluents the average yearly concentrations reached in the receiving waterbodies are shown, expressed as a percentage of the maximum permissible concentration in drinking water. An evaluation of maximum exposure around each plant site is made and a ratio of activity discharged to energy produced is given. (Houser-ORNL)
W74-12037

DISTRIBUTION, BIOLOGICAL EFFECTS, AND MIGRATION OF RADIOACTIVE ISOTOPES.
Available from NTIS, Springfield, Va 22161 as AEC-tr-7512; $10.60/copy, $2.25/microfiche. Atomic Energy Commission Report AEC-tr-7512, April 1974. 412 p, 116 fig, 186 tab, 1 biblio. Trans of Raspredelenie, Biologich eskoe Deistvie i Migratsiya, Radioaktivnykh Izotopov, Moscow 1961.

Descriptors: *Radioactivity, *Nuclear energy, *Air pollution, *Water pollution, *Soil contamination, *Water pollution sources, Nuclear explosions, Nuclear powerplants, Effluents, Bio-control, Radioactivity effects, Environmental effects, Human populations, Strontium, Cesium, Barium, Lanthanum, Ruthenium, Plutonium, Yttrium.

The scientific community of the world is becoming increasingly concerned with the problems of distribution, increased excretion, biological effects, and migration in the biosphere of radioactive nuclides. This is due to the fact not only of the possibility of broad use of atomic energy in industry, agriculture, medicine, and scientific research, discovered in the last decade, but chiefly to the progressive increase in radioactive background of earth as a result of nuclear arms testing, which is closely related to the problem of chronic exposure of man to small doses of ionizing radiation and possible appearance of long-term consequences of such exposure. This collection of reports submits data on distribution, accelerated excretion, biological effects, and migration in the biosphere of radioactive isotopes, including such practically important nuclides as cesium-137, strontium-89, strontium-90, barium-140, cerium-144, lanthanum-140, ruthenium-106, plutonium-239, and yttrium-91. (See W74-12039 thru W74-12043) (Houser-ORNL)
W74-12038

MIGRATION OF RADIOACTIVE STRONTIUM IN THE BIOSPHERE - SOME DATA ON RADIOSTRONTIUM AS A FACTOR IN ENVIRONMENTAL CONTAMINATION,
A. N. Marei.
In: AEC-tr-7512, p 349-358, April 1974. 1 diagram, 1 bibliography.

Descriptors: *Strontium, *Environmental effects, Aquatic environment, Reservoirs, *Potable water, *Fish, Food, Irrigation, *Food chains, Freshwater, Water pollution sources, Path of pollutants, Nuclear explosions, Fallout, Nuclear powerplants, Effluents, Nuclear wastes, Waste disposal, Meteorology.

The chief cause of increased radioactive background is the gradual accumulation on the earth's surface of products of uranium fission, chiefly as a result of nuclear arms tests. In addition, there are local contaminations due to radioactive waste. A chief component of the man-made radioactivity on the earth's surface is strontium. At the present time, the quantity of radioactive strontium that has settled from the atmosphere per unit of earth's surface varies. The behavior of long-lived radioactive contaminants that reach the environment is determined chiefly by two processes; dissipation and concentration, and the latter is closely related to biological phenomena, and is important to man. Radioactive fallout from the enormous volume of atmospheric air on the earth's surface could be viewed as a distinctive process of concentration of the entire mixture of radioactive elements in it. The great hygienic significance of this problem makes it imperative to continue investigation of the patterns of behavior

of strontium under diverse environmental conditions and to conduct precise quantitative estimation of its effects on man. (See also W74-12038) (Houser-ORNL)
W74-12039

SOME DATA ON MOVEMENT OF RADIOSTRONTIUM WITH GROUNDWATER CURRENT,
A. S. Belitskii, E. I. Orlova, and A. I. Ryzhov.
In: AEC-tr-7512, p 359-367, April 1974. 4 fig, 4 tab, 1 bibliography.

Descriptors: *Strontium, *Groundwater movement, *Migration, Migration patterns, Distribution, Water flow, Absorption, Desorption, Sands, *Path of pollutants, *Radioisotopes.

Migration of radiostrontium in ground water is a rather complex process related to factors mentioned below. These factors must be taken into consideration when defining the size of the sanitary safety area around sources of radioactive contamination. To date, processes of migration of radioactive substances in underground water have not been sufficiently investigated, so that there must be significant expansion in the future of field and laboratory experimental investigations in this area. The more important factors to consider in the movement of radiostrontium with groundwater currents are: (1) It is distributed chiefly in the direction of water flow. (2) Most of the radioactive strontium contained in groundwater is sorbed by sand near the contamination site. (3) Radioactive strontium absorbed by sand may re-enter groundwater as a result of desorption. (See also W74-12038) (Houser-ORNL)
W74-12040

EFFECTS OF RADIOACTIVE STRONTIUM ON MICROFLORA OF WATER AND ON MINERALIZATION PROCESSES OF ORGANIC SUBSTANCES,
For primary bibliographic entry see Field 5D.
W74-12041

ACCUMULATION OF STRONTIUM-90 IN YOUNG CARP,
G. D. Lebedeva.
In: AEC-tr-7512, p 375-378, April 1974. 3 tab, 1 biblio.

Descriptors: *Strontium, *Radioisotopes, Oceans, Sea water, Bodies of water, *Fish, *Aquatic life, *Radioactivity, *Absorption, Digestion, Speciation, Assessment, Assay, *Carp.

The use of radioactive isotopes in the national economy and in scientific research could, in spite of precautionary measures, lead to contamination of bodies of water. In view of this, many works have been published in recent times dealing with accumulation of radioisotopes in fresh and salt water organisms. Aquatic organisms have the capacity of accumulating radioactive substances with varying intensity. The rate of accumulation depends on the type of radioactive element, as well as species and physiological state of the organism. The objective of this work was to determine the rate of accumulation of radioisotopes by very young, 2-week-old fish, as well as to compare the intensity of radioisotopes accumulation in young fish of different species. (See also W74-12038) (Houser-ORNL)
W74-12042

DISTRIBUTION, ELIMINATION, AND COEFFICIENTS OF ACCUMULATION OF STRONTIUM-90, CESIUM-137, AND PHOSPHORUS-32 IN FISH,
D. I. Il'in, and Yu. I. Moskalev.
In: AEC-tr-7512, p 379-387, April 1974. 6 tab, 1 biblio.

Descriptors: *Reservoirs, *Public health, *Radioactivity, *Fish, *Food chains, *Human population, Bio-control, Assay, *Radioisotopes, Rates, Strontium, Cesium, Phosphorus, Aquatic environment, Transfer, Ion exchange, *Path of pollutants, Distribution, Transmissivity.

In response to the need to make a hygienic evaluation of the harmfulness of radioactive radiations, investigation of migration of radioactive elements of different biological chains, particularly those ending with man, is gaining much importance. Fish are an important element in one of these biological chains. Like numerous other living organisms, they have the capacity to concentrate radioactive substances, and for this reason they can be involved in transfer activity from the environment into the human body. Data are submitted on distribution, elimination, and coefficients of accumulation of strontium-90, cesium-137, and phosphorus-32 in organs of fish inhabiting a natural reservoir. (See also W74-12038) (Houser-ORNL)
W74-12043

ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1973,
Battelle-Pacific Northwest Lab., Richland, Wash. Occupational and Environmental Safety Dept.
W. L. Nees, and J. P. Corley.
Available from NTIS, Springfield, Va 22161 as Rept No BNWL-1811; $5.45/copy, $2.25/microfiche. Report No BNWL-1811, April 1974. 78 p, 14 fig, 22 tab, 21 ref, 5 append.

Descriptors: *Radioactivity, *Monitoring, Environment, *Sites, *Sampling, Analysis, Surface water, Groundwater, Air, Foods, Soils, Vegetation, Columbia River, Nuclear powerplants, Effluents, Safety, Evaluation, *Washington.
Identifiers: *Hanford Site(Wash).

The 1973 Hanford Environmental Surveillance Program showed continued compliance of the Hanford contractors and their operations with applicable environmental standards. Samples of surface water, groundwater, air, foodstuffs, soil, and vegetation were collected and analyzed for radioactivity. Columbia River water also received chemical and biological analysis. Additionally, measurements were made of river immersion exposure rate, surface exposure rate (1 meter above soil surface), and radionuclide deposition on soil surfaces and highways open to public access. The shutdown of the last of the single-pass cooled production reactors (KE) in January of 1971 eliminated the major remaining source of population exposure from Hanford operations. In 1973, the average river radionuclide concentrations were less than 0.5% of the Concentration Guides for all identified radionuclides. Detail data are given. (Houser-ORNL)
W74-12044

A SURVEY OF UNIQUE TECHNICAL FEATURES OF THE FLOATING NUCLEAR POWER PLANT CONCEPT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-12045

ENVIRONMENTAL MONITORING REPORT FOR SANDIA LABORATORIES FOR 1973,
Sandia Lab., Albuquerque, N. Mex.
L. W. Brewer.
Available from NTIS, Springfield, Va 22161 as Rept No SLA-74-0167; $4/copy, $2.25/microfiche. Report No SLA-74-0167, April 1974. 26 p, 1 fig, 2 append.

Descriptors: *Monitoring, Environment, *Air pollution, *Water pollution, *Radioactivity, Water pollution sources, Soil contamination, Environmental effects, Environmental control, Sampling, Data collections, Regulation, Vegetation, Potable water, *New Mexico.
Identifiers: *Sandia Laboratories(N Mex).

Water, soil, and vegetation are regularly monitored by several different methods and the results analyzed to assure that Sandia Laboratories operations are not adversely affecting the surrounding environment. The radiation levels are presented for the year 1973. Based upon the environmental sampling data presented, Sandia Laboratories has not released any significant amount of radioactive contaminants to the environment during the period from January 1, 1973, through December 31, 1973. The 1973 data on soil radioactivity by comparison with previous years activity levels (obtained before the start of the two reactor facilities) and the vegetation data on the average have remained relatively constant. Water-sampling data show activity of less than the 1 x 10(minus 7) microCi Beta/ml of drinking water, which is the standard recommended for identified radionuclides according to AEC Manual Chapter 0524. (Houser-ORNL)
W74-12047

TEMPERATURE EFFECTS ON THE SORPTION OF RADIONUCLIDES BY AQUATIC ORGANISMS,
Du Pont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5C.
W74-12048

RADIOACTIVITY AND HUMAN DIET.
For primary bibliographic entry see Field 5C.
W74-12049

FOOD CHAINS IN FRESH WATER,
Battelle-Pacific Northwest Lab., Richland, Wash. Biology Dept.
For primary bibliographic entry see Field 5C.
W74-12050

GROUNDWATER RESOURCES OF THE HOLLYWOOD AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 4B.
W74-12054

A NUMERICAL MODEL OF MATERIAL TRANSPORT IN SALT-WEDGE ESTUARIES, PARTS I AND II,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2L.
W74-12057

INDICATORS OF ORGANIC CONTAMINATION IN PLANTATION CANAL, BROWARD COUNTY, FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
T. N. Russo.
Florida Bureau of Geology, Tallahassee Report of Investigations No 70, 1974. 38 p, 18 fig, 8 tab, 20 ref.

Descriptors: *Water pollution, *Canals, *Florida, Water pollution sources, Municipal wastes, Water pollution effects, Biochemical oxygen demand, Dissolved oxygen, Eutrophication, *Bioindicators.
Identifiers: *Ft. Lauderdale(Fla).

The principal source of the organic materials in Plantation Canal, Fort Lauderdale, Florida, is effluent from sewage treatment plants. The waters of Plantation Canal contain large quantities of oxygen-demanding wastes and plant nutrients. Dissolved oxygen probably reaches zero just above the bottom sediments. When conditions are anoxic, anaerobic decomposition produced objectionable odors. The high concentrations of nutrients result in luxuriant growth of algae and floating

aquatic plants. These plants may discolor the water, inhibit flow and exert an oxygen demand when respiring and undergoing decomposition. Human wastes and, possibly, pathogenic bacteria are present. The bottom sediments in both Plantation Canal and South New River Canal exert an oxygen demand upon the overlying waters. They also contain high levels of plant nutrients, metals and pesticides that may be released into the overlying waters. The bottom sediments in Plantation Canal are composed of highly decomposed and stabilized sludges. The composition of the benthic communities reflects the quality of the bottom sediments and overlying waters. (Knapp-USGS)
W74-12070

A FEASIBILITY STUDY OF USING REMOTELY SENSED DATA FOR WATER RESOURCE MODELS,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 2A.
W74-12072

WATER QUALITY AND RELATED STUDIES, JACKSONVILLE AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
R. W. Fairchild, and G. W. Leve.
Open-file report (Florida 73035), 1973. 34 p 11 fig, 5 tab, 10 ref.

Descriptors: *Water quality, *Urban hydrology, *Florida, Sampling, Stream gages, Streamflow, Landfills, Water pollution sources, Path of pollutants, *Hydrologic data, Basic data collections.
Identifiers: *Jacksonville(Fla), Duval County(Fla).

The water resources in the Jacksonville area, Florida, have been studied since 1960. Several studies have dealt with the water quality of streams. The U.S. Geological Survey operates 10 streamflow and sampling stations at various places on the St. Johns River. A water-quality monitor on the St. Johns River at the Main Street Bridge records hourly temperature, dissolved oxygen, pH and specific electrical conductance of the water in the river. The hourly and daily maximum, minimum and mean values of each parameter are tabulated on a computer printout. Studies are being made that will be useful for selecting and monitoring sanitary landfill sites. Geohydrologic data are presented on maps that will be useful in determining the suitability of a site for sanitary landfills or septic tanks. A comprehensive water-quality management plan is underway to identify the quality of existing receiving waters before pollution. Headwaters of eight streams in Duval County are sampled to obtain water-quality information for the city of Jacksonville in its pollution abatement program. (Knapp-USGS)
W74-12077

PETROLEUM WEATHERING: SOME PATHWAYS, FATE, AND DISPOSITION ON MARINE WATERS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
M. H. Feldman.
Available from NTIS, Springfield, Va 22161 as PB-227 278 Price $4.50 Printed copy; $2.25 microfiche. Environmental Protection Agency Ecological Research Studies Report EPA 660/3-73-013, September 1973. 22 p, 1 fig, 6 tab, 13 ref.

Descriptors: *Oil pollution, *Oil spills, *Weathering, *Degradation(Decomposition), Chemical degradation, Public health, *Path of pollutants, Sedimentation, Trace elements.
Identifiers: *Photolysis.

Weathering of oil pollution on marine waters is discussed. Photolysis, interactions with trace materials, and sedimentation with particulate materials are effective and have possible ecological importance. Generation of carcinogenics from close molecular precursors is considered probable. (Knapp-USGS)
W74-12084

INTERFACILA SHEAR STRESS IN DENSITY WEDGES,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 8B.
W74-12096

CIRCULAR TURBULENT JET IN AN OPPOSING INFINITE STREAM,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
S. Beltaos, and N. Rajaratnam.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 220-237, 1973. 8 fig, 1 tab, 11 ref.

Descriptors: *Jets, *Mixing, *Dispersion, *Waste dilution, Path of pollutants, Waste disposal, Waste water disposal.
Identifiers: Counterflow jets.

Jets in counterflow spread rapidly and can be used to obtain rapid dilution of effluent discharges. The propagation of a turbulent round jet in an infinite opposing stream was studied utilizing data available in literature and new experimental data. It is possible to predict the flow field in a simple manner, using a semiempirical approach. Preliminary comparisons show that a jet issuing against a stream is an efficient means for obtaining rapid dilution of effluent discharges. (See also W74-12087) (Knapp-USGS)
W74-12097

LATERAL MIXING CHARACTERISTICS OF THE HYDRAULIC JUMP IN A SPATIALLY-VARIED FLOW,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
R. Townsend, and D. L. Egar.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 238-256, 1973. 13 fig, 5 ref.

Descriptors: *Mixing, *Hydraulic jump, *Heated water, Waste water disposal, Thermal pollution, Open channel flow, Water pollution sources.

Hydraulic jump can be used to effect rapid lateral mixing of a tempering flow introduced on one side of a model effluent discharge channel. The problem of predicting the location of jumps, with spatially varied upstream flows, was considered. Tests indicated that a jump could be used effectively to accelerate the mixing process, and that standard methods for the prediction of location are inadequate when the jump forms near the confluence of the two streams. (See also W74-12087) (Knapp-USGS)
W74-12098

REAERATION IN OPEN-CHANNEL FLOW,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5G.
W74-12099

APPLICATION OF THE CONCEPT OF BIFURCATED PLUME TO SOME OIL POLLUTION PROBLEMS IN THE STRAIT OF GEORGIA,
Alberta Univ., Edmonton. Inst. of Earth and Planetary Physics.
M. L. Khandekar, and T. S. Murty.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 273-286, 1973. 5 fig, 4 tab, 6 ref.

Descriptors: *Path of pollutants, *Oil spills, *Straits, *Canada, *Stratified flow, Tides, Currents(Water).
Identifiers: *Strait of Georgia(Canada).

The effect of stratification on the spread of oil leaking from a grounded ship was determined for three different locations in the Strait of Georgia. The calculations were made for different crude oils and residues covering a range of densities and also covering a range of tidal and wind generated currents as well as different rates of oil leaks. (See also W74-12087) (Knapp-USGS)
W74-12100

NUMERICAL MODEL STUDIES OF RIVERS AND ESTUARIES,
National Research Council of Canada, Ottawa (Ontario). Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-12101

FORECASTING POLLUTION IN RIVERS, ESTUARIES AND THE SEA,
Water Pollution Research Lab., Stevenage (England).
I. C. Hart, M. J. Barrett, and A. L. H. Gameson.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 129-180, 25-27 September, 1973. 17 fig, 4 tab, 23 equ, 26 ref.

Descriptors: *Water pollution control, *Forecasting, *River systems, *Estuaries, *Oceans, *Computers, *Model studies, Sewage, Effluents, Simulation analysis, Coliforms, Data collections, Discharge(Water), Pollutants, Dissolved oxygen, Systems analysis.
Identifiers: Offshore areas, Trent River(England), Inorganic nitrogen.

The Water Pollution Research Laboratory examines the effects produced by the discharge of polluting liquids into natural waters. Studying existing situations in sufficient detail facilitates forcasting pollution in other circumstances and other systems. These effects are generally very complex and frequent use is made of computers to deal with the large number of interrelated factors and to expedite the numerical work. This paper illustrates the utilization of computers to tackle three separate problems of pollution forecasting: in rivers, estuaries, and the sea. In each case, details are given of the methods of data analysis. The first section shows how the examination of mass budgets in rivers and the determination of the sources of pollutants enable the construction of forecasting models for water quality. A model developed for predicting concentrations of inorganic nitrogen is described. In section 2, methods for predicting the effect of changes in quantity or quality of effluents in estuaries are reviewed: mixed-segment model; quantized mixing model; time-dependent models; and a two-dimensional steady-state model. Considered also is the calculation of distribution of dissolved oxygen. Section 3 presents a simple simulation model of the processes occurring in the sea, accounting for the rate of addition of coliform bacteria, the initial dispersion, vertical mixing, topography, tidal movement, eddy diffusion, and coliform mortality. Input data are considered and the results examined. (See also W74-12107) (Bell-Cornell)
W74-12116

COMPUTER APPLICATIONS IN WATER QUALITY MODELLING: PREDICTION OF AMMONIACAL NITROGEN IN THE RIVER THAMES,
EASAMS, Camberley (England).
N. C. Oxley.

In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 71-74, 25-27 September 1973. 1 fig, 1 tab.

Descriptors: *Water quality control, *Computer models, *River systems, *Statistical models, *Monitoring, Effluents, Standards, Equations, Hydrologic data, Stochastic processes, Catchments, Reach(Streams), Management, Systems analysis.
Identifiers: *River Thames(England), *Ammoniacal nitrogen, Concentration, Sewage works.

Due to the current concern over the effects of increasing discharges of sewage effluent, a computer model has been developed to predict the concentration of Ammoniacal Nitrogen at defined points in the Thames River. High ammonia concentrations inhibit the disinfection of water for supply and raise the costs of chlorination. Water quality relationships have been developed from a statistical basis, using data routinely collected by the Thames Conservancy from 1967 through 1973. The situation for each discrete element, into which the River may be divided, is amenable to multiple regression analysis, the final concentration being the dependent variable. The whole complex system of inputs and abstractions is broken down into a series of rational systems, each amenable to computer analysis. Individual regression equations have been built into the final model to predict ammonia concentrations at 12 monitoring points in the main river. Statistical modelling recognizes the stochastic nature of those parameters affecting quality levels, while obviating the necessity for long-term research into causal interactive relationships. The short computer time required to generate a series of predictions of concentration, and the accuracy of the predictions, suggests that this may be a useful technique in water quality management. (See also W74-12107) (Bell-Cornell)
W74-12139

ECOLOGICAL STUDY OF SALMONELLA IN WASTE WATER, STAGNANT WATER, RUNNING STREAMS AND DOMESTIC WELLS OF ANJOU, (IN FRENCH),
Faculte de Medecine et Pharmacie, Angers (France). Laboratoire de Bacteriologie.
F. Parvery, J. P. Becaud, G. Chambreuil, and B. Carbonnelle.
Rev Epidemiol Med Soc Sante Publique. Vol 20, No 7, p 603-618, 1972. English summary.
Identifiers: *Ecological studies, *Salmonella, Salmonellosis, Stagnant water, Streams, Wastes, Water wells, *France(Anjou), Water pollution sources.

In the framework of an ecological survey carried out on Salmonella in Anjou, France, 2372 samples were analyzed. Strains (109) of Salmonella were isolated. The great diversity of the serotypes found is underlined. When a sufficient number of these serotypes are isolated, they appear to be the same ones as those isolated in patients. The chronological and topographical concordance is also reported. The isolation of a serotype in water at a given season often procedes the finding of corresponding clinical cases. In another connection, the distribution of the cases of human salmonellosis, especially along rivers, is obvious. The climatologic factors eventually linked to the contamination of water by Salmonella were analyzed: temperature, rain, river, flow, etc. The water purification stations are helpless in the treatment of bacterial pollution. These stations sometimes even introduce pathogenic bacteria. Such stations could be the ideal way to control endemics, if a serious effort were made to ensure bacteriological purification.--Copyright 1973, Biological Abstracts, Inc.
W74-12152

SANITARY AND HYDROBIOLOGICAL CHARACTERISTICS OF THE SAMUR-APSHERON CANAL, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W74-12153

SPATIAL AND TIME CHANGES OF SOME ENVIRONMENTAL FACTORS IN THE PELAGIAL OF MIKOLAJSKIE LAKE,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
For primary bibliographic entry see Field 2H.
W74-12155

PHOTOIONIZATION OF PHENOLS IN WATER: EFFECTS OF LIGHT INTENSITY, OXYGEN, PH, AND TEMPERATURE,
Hebrew Univ., Jerusalem (Israel). Dept. of Physical Chemistry.
J. Feitelson, E. Hayon, and A. Treinin.
J Am Chem Soc. Vol 95, No 4, p 1025-1029, 1973, Illus.
Identifiers: *Cresol, Ionization, Light intensity, Oxygen, *Phenols, *Photoionization, Temperature, *Tyrosine, Hydrogen ion concentration.

The effects of flash intensity, oxygen, pH, and temperature on the photoionization of p-cresol and tyrosine were investigated by measuring the yields of the phenoxyl radicals generated in aqueous solutions. Photoionization of the phenols and their anions in alkaline solution occur via biphotonic and monophotonic processes, respectively. The (phenoxyl) is proportional to I sup n, where n changes from 2 to 1 over a relatively narrow pH range. In air-saturated solutions of the phenols, the transient absorption spectra of the phenoxyl radicals are observed but their initial yields are somewhat lower and are proportional to approximately I1.5. There is no distinct difference between the effects of 1 atm of air and 1 atm of O2. In alkaline solutions (pH approximately 12) the effect of oxygen is relatively small. On the other hand, the anions display much higher sensitivity toward temperature; in alkaline solutions the yield of photoionization is hardly affected over the same temperature range. These results are interpreted on the basis of a mechanism involving ionization of triplet excited-state molecules. In neutral solutions the triplets exist in their acidic form and their ionization is induced by light, whereas in alkaline solutions the basic forms of the triplets, which are shorter lived, undergo thermal ionization with higher activation energy. A possible explanation of the oxygen effect is the formation of longer lived triplet-oxygen complexes which are then photoionized. Under all conditions employed the lifetimes of the precursors of phenoxyl radicals and e sub aq appear to be short compared to the duration of the flash employed (approximately 10 microsec).--Copyright 1973, Biological Abstracts, Inc.
W74-12169

BACTERIA AND THE ASSESSMENT OF WATER QUALITY,
Academy of Natural Sciences of Philadelphia, Pa. Dept. of Limnology.
For primary bibliographic entry see Field 5A.
W74-12179

STABILIZATION OXYGEN DEMAND,
Weston and Stack, Inc., Malvern, Pa.
For primary bibliographic entry see Field 5A.
W74-12188

USE OF ARTIFICIAL SUBSTRATE SAMPLERS TO ASSESS WATER POLLUTION,
For primary bibliographic entry see Field 5A.
W74-12190

EFFECT OF TEMPERATURE AND OXYGEN PRESSURE ON CELLULOSE UTILIZATION BY THERMOPHILIC ORGANISMS,
Rhode Island Univ., Kingston. Dept. of Chemical Engineering, and Rhode Island Univ., Kingston. Dept. of Microbiology.
For primary bibliographic entry see Field 5D.
W74-12193

WORKBOOK OF THERMAL PLUME PREDICTION, VOLUME 2, SURFACE DISCHARGES,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
M. A. Shirazi, and L. R. Davis.
Copy Available from GPO Sup Doc as EP1.23/2:72-005b, $4.15; microfiche from NTIS, Springfield, Va 22161 as PB-235 841, $2.25, 441 pages. Environmental Protection Agency Technology Series Report EPA-R2-72-005b, May 1974. 430 p, 8 fig, 8 tab, 3 ref, 6 append. EPA Project 16130 FHH, Program Element 1BA032.

Descriptors: *Thermal pollution, *Discharge(Water), Water quality, Water quality control, Water pollution, Water pollution control, Surface waters, *Forecasting.
Identifiers: *Surface discharge, *Thermal plumes.

In a continuing effort to present current knowledge on heated plume prediction, nomograms are presented that describe the behavior of surface jets for a wide range of ambient and initial discharge conditions encountered in practice. An attempt is made to present the material in a concise manner and in a format that is clear and accessible to a nonspecialist user. Many fundamental derivations are retained for further reading in the appendix; these undoubtedly would be of use to the specialist researcher. The nomograms provide qualitative results describing the surface plume trajectory, width, temperature, depth, surface area and time of travel along the plume centerline. The nomograms are not intended to be used as exclusive design tools for surface discharge problems for use in a precise prediction of any specific surface plume condition. The nomograms are generated predominately from an idealized mathematical model of a plume. Some field and laboratory data have been used to adjust the performance of the model so that more realistic predictions are obtained. However, the class of problems that can be handled this way are limited due to the limitations in the model itself. The main restrictions included in the model are described both in a special chapter and in example problems. (See also W74-05111) (EPA)
W74-12212

FIRST ANNUAL REPORTS OF THE EPA IFYGL PROJECTS.
National Environmental Research Center, Grosse Ile, Mich. Grosse Ile Lab.
For primary bibliographic entry see Field 5C.
W74-12214

NITROGEN AND PHOSPHORUS LOSSES FROM AGRONOMY PLOTS IN NORTH ALABAMA,
Alabama A and M Univ., Normal.
R. R. Bradford.
Copy available from GPO Sup Doc as EP1.23:660/2-74-033, $0.90; microfiche from NTIS as PB-235 931. Environmental Protection Agency Technology Series Report EPA-660/2-74-033, April 1974. 40 p, 9 fig, 15 tab, 14 ref. EPA Project 13020 DWH, 80401.

Descriptors: Water quality, Water pollution control, *Nitrogen, *Phosphorus, Seasonal, Fertilizers, Sediments, *Alabama, Silts, Loam, Nutrients, *Cooper, Ureas, Nitrates, Cotton, Corn(Field), Soybeans, Path of pollutants.
Identifiers: *Nutrient loss reduction, *Decatur silt loam, Seasonal-Cropping-Fertilizer effects, Sediment loss interactions, Millet, Ammonium nitrate, Sulfur-coated urea.

A study of nitrogen and phosphorus losses from Decatur silt loam soil was conducted over three cropping periods from 1969-1972. Experimental agronomy plots were seeded to cotton, corn, soybeans, and millet and compared with uncropped and unfertilized check plots. The effects of these crops on nitrogen losses--total nitrogen, nitrate-nitrogen, and ammonium-nitrogen (for 1971-1972 only) and phosphorus losses were evaluated. Average total rainfall and losses of sediment and runoff were also determined. Losses of total nitrogen and nitrate-nitrogen were generally positively correlated with the amounts of rainfall, runoff, and sediment. Phosphorus losses were positively correlated with sediment losses. More than 95% of phosphorus losses were associated with sediment loss. The effect of crops on loss of all nutrients was considerably smaller than seasonal effects and sediment losses. The effect of two fertilizers, ammonium nitrate and sulfur-coated urea, upon nutrient losses showed no evidence of superiority for sulfur-coated urea in reducing the total nitrogen or nitrate-nitrogen losses. (EPA)
W74-12221

STATE-OF-THE-ART: SAND AND GRAVEL INDUSTRY,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
B. D. Newport, and J. E. Moyer.
Copy available from GPO Sup Doc as EP1.23:660/2-74-066, $0.85; microfiche from NTIS as PB-236 147 MF $2.25. Environmental Protection Agency Technology Series Report EPA-660/2-74-066, June 1974. 40 p, 6 fig, 1 tab, 31 ref. EPA Project 21 AGG-02, Program Element 1BB040.

Descriptors: *Water pollution sources, *Discharge(Water), *Sediment transport, *Degradation(Stream), *Sediment control, Stream erosion, Discharge(Sediment), Excavation, Ecology, Flocculation, Storm runoff, *Sands, *Gravel, Reviews.

An overview is presented of the sand and gravel industry in the United States and its relationship to the environment. The fate and effects of sediment generated by this surface mining activity on the benthic, planktonic, and fish communities of waterways are discussed in detail. Problems of the sand and gravel industry, types of operations, status of current treatment technology, and legislation affecting the industry are reviewed. (EPA)
W74-12224

LEVELS OF COBALT, CESIUM AND ZINC IN SOME MARINE ORGANISMS IN JAPAN,
National Inst. of Radiological Sciences, Chiba (Japan). Div. of Environmental Health.
For primary bibliographic entry see Field 5C.
W74-12244

ACUTE TOXICITY AND ACCUMULATION OF PCB (KC 300) IN FRESHWATER FISH, (IN JAPANESE),
Freshwater Fisheries Research Lab., Tokyo (Japan).
For primary bibliographic entry see Field 5C.
W74-12245

SOME PARTICULATE AND SOLUBLE AGENTS AFFECTING THE RELATIONSHIP BETWEEN METAL TOXICITY AND ORGANISM SURVIVAL IN THE CALANOID COPEPOD EUCHAETA JAPONICA,
British Columbia Univ., Vancouver. Inst. of Oceanography.
For primary bibliographic entry see Field 5C.
W74-12250

COASTAL MARINE POLLUTION AND FISH,
Fisheries Research Board of Canada, West Vancouver, B.C. Pacific Environmental Inst.
For primary bibliographic entry see Field 5C.
W74-12252

AMMONIA EXCRETION BY ZOOPLANKTON AND ITS SIGNIFICANCE TO PRIMARY PRODUCTIVITY DURING SUMMER,
Univ. of Washington, Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W74-12253

VARIATION OF COPPER, IRON, MANGANESE AND ZINC CONTENTS OF OYSTERS (CRASSOSTREA ANGULATA) AT DIFFERENT STAGES OF GONADAL DEVELOPMENT (VARIACIONES DEL CONTENIDO EN COBRE, HIERRO, MANGANESO Y CINC EN RELACION CON LA MADURACION SEXUAL DEL OSTION, CRASSOSTREA ANGULATA, DE LAS COSTAS DE CADIZ),
Instituto de Investigaciones Pesqueras, Cadiz (Spain).
For primary bibliographic entry see Field 5C.
W74-12255

STUDIES ON COPPER, IRON, MANGANESE AND ZINC IN OYSTERS (CRASSOSTREA ANGULATA) ON THE GULF OF CADIZ (ESTUDIOS DEL COBRE, HIERRO, MANGANESO Y CINC EN OSTIONES-CRASSOSTREA ANGULATA-DEL GOLFO DE CADIZ),
Instituto de Investigaciones Pesqueras, Cadiz (Spain).
For primary bibliographic entry see Field 5C.
W74-12256

THE USE OF BIOASSAYS TO DETERMINE THE RATE OF DEACTIVATION OF PESTICIDES,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
For primary bibliographic entry see Field 5C.
W74-12261

UPTAKE, METABOLISM AND DISCHARGE OF POLYCYCLIC AROMATIC HYDROCARBONS BY MARINE FISH,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5C.
W74-12262

THE FISH POPULATIONS OF AN INDUSTRIAL RIVER IN SOUTH WALES,
University of Wales Inst. of Science and Tech., Cardiff. Dept. of Applied Biology.
For primary bibliographic entry see Field 5C.
W74-12263

THE COMMON MUSSEL MYTILUS EDULIS AS INDICATOR FOR THE LEAD CONCENTRATION IN THE WESER ESTUARY AND THE GERMAN BIGHT, (DIE MIESMUSCHEL MYTILUS EDULIS ALS INDIKATOR FUR DIE BLEIKONZENTRATION IM WESERASTUAR UND IN DER DEUTSCHEN BUCHT),
Institut fuer Meeresforschung, Bremerhaven (West Germany).
J. Schulz-Baldes.
Marine Biology, Vol 21, No 2, p 98-102, 1973. 4 fig, 1 tab, 16 ref.

Descriptors: *Mussels, *Bioindicators, *Lead, Mollusks, Heavy metals, Metals, Pollutants, Spectrophotometry, Analytical techniques, Size, Bioassay, Gradation, Absorption, Estuaries, Water pollution sources, Heavy metals, Metals, Animal physiology.
Identifiers: *Mytilus edulis, Concentration, Kidney, *Germany(Weser Estuary), *Germany(German Bight).

Common mussels were collected at 13 stations of the Weser Estuary, and the German Bight in 3 size categories. Equal numbers of the 3 groups from each station were analyzed separately for lead concentration by flameless atomic-absorption spectrophotometry. The lead concentration of the soft parts decreases from 6.4 microgram/g dry weight 15 km northwest of Bremerhaven to 1.9 microgram/g at Helgoland. At the same station, the concentration in small mussels is higher than in larger mussels. The lead concentration is exceptionally high in the kidney, quite high in the intestine (with the digestive glands) and in the adductor muscle, and rather low in the foot, gills, and mantle with gonads. Laboratory experiments reveal that mussels directly reflect the actual lead concentration of their environment. The observed gradient in lead contents of M. edulis in the Weser Estuary can thus be explained by the dilution of the highly lead-polluted river water by the sea water of the German Bight. With this physiological property, M. edulis is, therefore, highly suitable as an indicator organism for lead, and possibly other heavy metal pollutants. (Katz)
W74-12265

NITRATE AND NITRITE TOXICITY TO SALMONID FISHES,
Rhode Island Univ., Kingston. Marine Experiment Station.
For primary bibliographic entry see Field 5C.
W74-12267

LEAD CONCENTRATION IN NATIVE TROUT,
Montana State Univ., Bozeman. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W74-12275

CHARACTERISTICS AND COMPARATIVE MAGNITUDE OF NON-POINT SOURCES,
Cornell Univ., Ithaca, N.Y. Coll. of Agricultural Engineering.
R. C. Loehr.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1849-1872, August 1974. 2 fig, 17 tab, 59 ref.

Descriptors: *Water pollution sources, *Phosphates, *Nitrogen, *Drainage, Fallout, Farm wastes, Storm runoff, Urban runoff, Tile drainage, Seepage, Runoff, Surface runoff, Agricultural runoff, Small watersheds, Forests, Surface waters, Return flow, Water quality, Feed lots.
Identifiers: *Non-point sources, Potential area yield rate.

Data from investigations reported in the literature of potential pollution sources were used in a comparison of the characteristics and relative magnitude of non-point sources discharged to surface waters. The comparisons were made in terms of concentration (mg/l) and potential area yield rate (kg/yr/ha). The non-point sources included precipitation, forest land runoff, range land runoff, cropland runoff, runoff from land receiving manure, cropland tile drainage, irrigation return flows, urban land runoff, manure seepage, and feedlot runoff. The feasibility of controlling the various non-point sources was discussed. Non-point sources of nitrogen and phosphorus were compared with point sources in a small number of watersheds. (Humphreys-ISWS)
W74-12278

METAL DISTRIBUTION ALONG A PROFILE OF AN INTER-TIDAL AREA,
Stockholm Univ. (Sweden). Geological Inst.
R. O. Hallberg.

Estuarine and Coastal Marine Science, Vol 2, No 2, p 153-170, 1974. 8 fig, 6 tab, 43 ref.

Descriptors: *Metals, *On-site investigations, *Sediments, *Tidal marshes, *Path of pollutants, Evaluation, Geologic investigations, Coastal marshes, Sampling, Sediment distribution, Shallow water, Marine geology, Chemical analysis, Sodium, Potassium, Magnesium, Calcium, Iron, Cobalt, Nickel, Copper, Lead, Profiles.
Identifiers: Silver, Netherlands(Ameland Island).

The sediment from an intertidal area was investigated with regard to the vertical and areal distribution of the acid-soluble metals: Na, K, Mg, Ca, Fe, Co, Ni, Cu, Ag and Pb. In addition to the metals, granulometric properties, content of organic matter, carbonate concentrations and Eh were measured. The metals were accumulated along the margins of the area and showed a high correlation with organic matter and the finest sediment fraction. The interstitial water was diluted with infiltratable rain water. The higher level of this water, of the marsh area compared with that of the tidal flat area, gives rise to an upward percolation in the sediment of the tidal flat area. The metal interrelationships and concentrations were determined by processes in the uppermost oxidized layer and only to a minor extent by reducing processes in the lower hydrogen sulphide-rich layers. (Humphreys-ISWS)
W74-12280

THE EMISSION OF BIOGENIC HYDROGEN SULFIDE FROM AMAZONIAN FLOODPLAIN LAKES,
Instituto Nacional de Pesquisas da Amazonia, Manaus (Brazil).
W. L. F. Brinkmann, and U. De. M. Santos.
Tellus, Vol 26, No 1-2, p 261-267, 1974. 6 fig, 5 ref.

Descriptors: *Lakes, *Hydrogen sulfide, *On-site investigations, *Dissolved oxygen, Flood plains, Hypolimnion, Limnology, Sulfides, Oxygen, Water pollution, Sampling, Chemical analysis, Fronts(Atmospheric), Floods, Fallout, Rain forests, Distribution patterns, Profiles.
Identifiers: *Amazon River, *Brazil(Lago do Castanho), Biogenic hydrogen sulfide, Cold front.

The emission of hydrogen sulfide from Amazonian floodplain lakes was detected mainly during the period of falling water of the Amazon river, which peaks out in September and October. Hydrogen sulfide was present even in some surface water samples (up to 0.40 mg at. H2S as S/1). A part of the emitted hydrogen sulfide was recycled on a regional or local scale by means of biospheric trap mechanisms and eventual rainout, sustaining the tight sulfur cycle of the Amazonian tropics. But a certain amount of the emitted hydrogen sulfide contributed to the atmospheric sulfur budget. Under cold front conditions, however, the emitted hydrogen sulfide was rapidly recycled into the tropical forest stands. (Humphreys-ISWS)
W74-12284

ADSORPTION OF PHOSPHATE BY RIVER PARTICULATE MATTER,
Illinois State Water Survey, Peoria. Water Quality Section.
W-C. Wang.
Water Resources Bulletin, American Water Resources Association, Vol 10, No 4, p 662-671, August 1974. 6 fig, 1 tab, 13 ref.

Descriptors: *Adsorption, *Sediments, *Phosphates, Water pollution sources, Isotherms, Montmorillonite, Bentonite, Laboratory tests, Suspended solids, Illinois.
Identifiers: *Illinois River(Ill), *Spoon River(Ill), Particulate water, Phosphate adsorption, Adsorption kinetics.

Adsorption of orthophosphate on samples of particulate matter taken from the Illinois and Spoon Rivers was investigated under laboratory conditions. Adsorption equilibria were reached in four to six days. Average adsorption rates between 0.0239 and 0.0366 were found during equilibration periods. Adsorption isotherms were computer, both for constant and for varying amounts of particulate matter in the two rivers. During investigation of the effects of pH on phosphate adsorption, the highest adsorptive capacities were found at natural pH values of 8.3-8.4. Reductions in pH dropped this capacity to a minimum at pH6. Some slight recovery of capacity was observed at pH5 and 4. Rates of adsorption were influenced by the equilibrium concentration of phosphate-P and were essentially the same for the Illinois and Spoon Rivers. However, based upon the quantity of phosphate-P adsorbed per unit weight of particulate matter present, the capacity of the Illinois was seven times that of the Spoon River. Adsorption isotherms for both streams were essentially linear, suggesting a functional relation between unit adsorption and particulate matter content. A concurrent study of samples collected daily from the Illinois River failed to show a similar correlation of particulate matter and phosphate adsorption. (Harmeson-ISWS)
W74-12288

THE ROLE OF OXYGEN IN NITROGEN LOSS FROM FLOODED SOILS,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 2G.
W74-12290

DETERMINATION OF DISPERSION AND NON-LINEAR ADSORPTION PARAMETERS FOR FLOW IN POROUS MEDIA,
Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
For primary bibliographic entry see Field 2G.
W74-12299

EXPERIMENTAL EVALUATION OF CHEMICAL TRANSPORT IN WATER-SATURATED POROUS MEDIA: 1. NONSORBING MEDIA,
Oregon State Univ., Corvallis. Dept. of Soil Science.; and Oregon State Univ., Corvallis. Dept. of Agricultural Chemistry.
For primary bibliographic entry see Field 2G.
W74-12306

PERSISTENCE AND MOVEMENT OF DBCP IN THREE TYPES OF SOIL,
California Univ., Davis. Dept. of Nematology.
L. R. Hodges, and B. Lear.
Soil Science, Vol 118, No 2, p 127-130, August 1974. 2 tab, 4 ref.

Descriptors: *Persistence, Movement, *Soil types, *Fumigants, *Injection, Irrigation water, Soil water, Gas chromatography, *Path of pollutants, Pollutant identification.
Identifiers: *Dibromochloropropane, Volatile chemicals, Sandy clay loam, Silt loam, Loamy sand.

The rates of distribution of dibromochloropropane (DBCP) and its persistence in three types of soil were compared after application by injection and flood irrigation. Measurement of DBCP by gas chromatography showed that an injection DBCP at a depth of 20 cm resulted in higher concentrations and deeper penetration in sandy clay loam and silt loam than when it was applied to irrigation water. Application of the same amount to the soil surface in 15 cm of water showed DBCP is trapped near the surface in these soils. Persistence is longer in these two soils and in loamy sand after injection. The most rapid penetration after application in water occurred in loamy sand where the rate and depth of penetration were greater than those measured after injection. This study indicates that type of soil is one of the most important aspects in deciding what method to use for applying DBCP. (Visocky-ISWS)
W74-12310

THE ABSORPTION OF LOW CONCENTRATIONS OF SULPHUR DIOXIDE INTO AQUEOUS SOLUTIONS,
Auckland Univ. (New Zealand). Dept. of Chemistry.
P. Brimblecombe, and D. J. Spedding.
Tellus, Vol 26, No 1-2, p 272-276, 1974. 4 fig, 2 tab, 11 ref.

Descriptors: Sulfur, *Sulfur compounds, *Absorption, *Aqueous solutions, Analytical techniques, Radiochemical analysis, Physical properties, Chemical properties, Sorption, Equilibrium, Solubility, Water vapor, Phase diagrams, Humidity, Water properties, Water pollution, Diffusion, Sulfates.
Identifiers: *Gas-phase diffusion, *Soultion phase diffusion, *Sulfur dioxide, Desorption, Beta-spectrometers, Liquid scintillation spectrometers, Oceanic absorption, Ionic strength.

The rate of deposition of gas-phase SO2 to a variety of aqueous solutions was measured. The deposition rate was unaffected by relative humidity. Some salts may cause a 3-fold decrease in deposition rate as the ionic strength changes from 0.1 M to 0.8 M. Solution pH has the greatest influence causing a change from gas-phase diffusion control to solution phase diffusion control of deposition between pH 4 and pH 2. Indirect evidence suggested that the catalysis of SO2 oxidation in solution by Mn (II) ions is slow with respect to SO2 diffusion into solution. The practical implications of these results were discussed. (Henley-ISWS)
W74-12311

WATER QUALITY AND POLLUTION--SOUTH FORK OF LONG ISLAND, NEW YORK,
Wisconsin Univ., Oshkosh. Dept. of Geology.
C. W. Fetter, Jr.
Water Resources Bulletin, American Water Resources Association, Vol 10, No 4, p779-788, August 1974. 3 fig, 5 tab, 5 ref.

Descriptors: *Water pollution, *Saline water intrusion, *Nitrates, Groundwater, Groundwater recharge, Water quality, *New York.
Identifiers: *Long Island(NY), Magothy aquifer, Glacial aquifer, Cesspools, Agricultural fertilizers.

The South Fork of Long Island is an area totally dependent on ground water for domestic and municipal water supply. Groundwater is contained in two geohydrologic units; the Glacial aquifer and the Magothy aquifer. The study evaluated water quality in both these aquifers as well as in several lakes and ponds. Listed as the principal sources of groundwater contamination were saline water encroachment, agricultural fertilizers, and the underground discharge of numerous cesspools. Less than ten percent of the population is served by sewers and sewage treatment. The nitrate content of 651 domestic wells was shown in a statistical tabulation. Some data on the presence of detergents and chlorides were given. Comparisons were made between ground and surface water quality. (Harmeson-ISWS)
W74-12313

THE SOLUBILITY OF VERY LOW CONCENTRATIONS OF CARBON MONOXIDE IN AQUEOUS SOLUTION,
Auckland Univ. (New Zealand). Dept. of Chemistry.
R. W. Meadows, and D. J. Spedding.
Tellus, Vol 26, No 1-2, p 143-150, 1974. 2 fig, 6 tab, 13 ref.

Descriptors: Carbon, *Oxides, *Aqueous solutions, *Solubility, Gases, Physical properties, Phase diagrams, Saturation, Pressure, Atmospheric pressure, Saline water, Sea water, Fresh water, Absorption.

Identifiers: *Carbon monoxide, Solubility coefficient, *Absorption coefficient, Partial pressure, Henry's law, Exchange constants, Boundary layer, Radiochemical technique, Desorption, Supersaturation, Gas phase, Marine water.

The solubility of carbon monixide in natural waters was determined when the partial pressure of carbon monoxide in the gas phase approaches atmospheric concentrations. For both pure water and seawater the solubilities were found to be more than eight times the values which have previously been observed with an atmosphere of pure carbon monoxide present. Carbon monoxide therefore does not obey Henry's law over the pressure range from approximately 0.00005 atmospheres to greater than one atmosphere. The exchange constant for the exchange of carbon monoxide across the boundary layer of aqueous solutions was also determined. Values for seawater range from 1.5 times 10 to the minus 7th power m/s under calm conditions to 1 times 0.000006 m/s under the most turbulent conditions studied. The data obtained was used to re-evaluate the existence and size of the proposed oceanic source of carbon monoxide. A value of 10 to the 11th power g of carbon monoxide was calculated for the amount of carbon monoxide produced annually by the world's oceans, and this represents only 0.05% of the estimated carbon monoxide produced by man, and less than 0.002% of the largest natural source of carbon monoxide, which is the atmospheric oxidation of methane. (Henley-ISWS)
W74-12316

ON THE ABSORPTION OF SO2 IN OCEAN WATER,
Frankfurt Univ. (West Germany). Institut fuer Meteorologie und Geophysik.
For primary bibliographic entry see Field 2K.
W74-12320

WATER CIRCULATION AND NUTRIENTS IN THE NORTH-WEST IRISH SEA,
Liverpool Univ. (England). Dept. of Marine Biology.
For primary bibliographic entry see Field 2L.
W74-12322

AUTO-QUAL MODELLING SYSTEM,
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.
R. L. Crim, and N. L. Lovelace.
Available from NTIS, Springfield, Va 22161 as PB-227 032, Price $18.50 printed copy; $2.25 microfiche. Technical Report 54, March 1973. 301 p.

Descriptors: *Water quality, *Path of pollutants, *Mathematical models, *Computer programs, Dissolved oxygen, Simulation analysis, Streamflow, Oxygen demand.

Two mathematical models were designed to meet needs of Federal, State or local agencies for water quality planning. The models are designed specifically for water bodies in which widths are small relative to their length. Most freshwater streams and tidal tributaries to estuarine bays fit that description. These are waters whose net hydraulic circulation patterns are essentially undirectional. (Knapp-USGS)
W74-12342

COASTAL - ESTUARINE AND NEARSHORE PROCESSES, AN ANNOTATED BIBLIOGRAPHY,
Ocean Engineering Informaton Service, La Jolla, Calif.
For primary bibliographic entry see Field 2L.
W74-12351

WATER RESOURCES PROTECTION MEASURES IN LAND DEVELOPMENT - A HANDBOOK,
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 5G.
W74-12352

EFFECTS OF CLEAR CUTTING ON WATER DISCHARGE AND NUTRIENT LOSS, BITTERROOT NATIONAL FOREST, MONTANA,
Montana Univ., Missoula. Dept. of Geology.
T. Bateridge.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 038, $3.75 in paper copy, $2.25 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Completion Report No 52, July, 1974. 68 p, 15 fig, 15 tab, 59 ref. OWRT A-071MONT(1). 14-31-0001-4026.

Descriptors: *Clear-cutting, *Water pollution sources, *Montana, Water yield improvement, Water quality, Water chemistry, Nutrients, Streamflow, Discharge(Water), *Roads, *Conductivity, *Ions, Path of pollutants.
Identifiers: *Bitterroot National Forest(Mont).

The effects of clearcutting and road-building on the hydrology and water-chemistry of three pairs of small watersheds in the Bitterroot National Forest in Western Montana were studied for one year (1973). The watersheds were all steep, 6,000 to 7,000 feet in elevation, and ranged from 103 to 866 acres in area. 1973 was an abnormally dry year. Streamflow discharge was monitored throughout the snowmelt runoff period on each watershed. Water samples were collected from which field measurements of electrical conductivity were made, and laboratory tests were made for five specifications. pH was measured in the field. For two of the three pairs of watersheds, streamflow throughout the season was greater on the clearcut basin. For the smallest pair the same trend was observed, but flow ceased after June 26th. Conductivity varied inversely with discharge, and in most cases was higher on the control (forested) watersheds. Concentrations of ions (nitrates, chlorides, divalent cations, sodium and potassium) were relatively low, but tended to increase as streamflow diminished, and were generally higher on clearcut watersheds. (Williams-Montana State)
W74-12359

EFFECTS OF SUSPENDED SILT ON DISSOLVED PHOSPHORUS LEVEL IN THE GALLATIN RIVER,
Montana State Univ., Bozeman. Dept. of Plant and Soil Science.
F. J. Adamsen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 048, $4.00 in paper copy, $2.25 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Completion Report No. 56, August 1974. 79 p, 10 fig, 13 tab, 61 ref, (M.S. Thesis). OWRT A-060 MONT(1). 14-31-0001-3826.

Descriptors: Water pollution sources, *Phosphorus, *Montana, *Suspended load, Dissolved solids, Phosphates, Soil erosion, *Sediment transport, Calcium, *Path of pollutants, Carbonates, Sulfates.
Identifiers: *Gallatin River(Mont).

A two-year study of suspended sediments in the Gallatin River of southwestern Montana and its tributaries reveals that the predominations in the water were Ca+2 and HC0-3. During May and June, the concentration of dissolved solids was lower than in other periods (attributed to increased runoff from melting snow). During these months concentrations of suspended solids and dissolved phosphorus and the phosphorus content of the sediments were highest (probably due to increased amounts of surface soil erosion). The East Gallatin River (a major tributary draining significant areas of irrigated farmland as well as serving as receptor for Bozeman's sewage effluent) was supersaturated in phosphorus with respect to hydroxyapatite, while sites on the main stem Gallatin above the East Gallatin were below saturation. Extraction of sediments with NaHCO3 showed sediments from the East Gallatin to be higher in extractable phosphorus than upstream sites. Extraction of phorphorus from the sediments by fungus indicated that 20 to 70 percent of the phorphorus content of the sediments may be biologically available. (Williams-Montana State)
W74-12361

EVOLUTION OF ANOXIC CONDITIONS IN BLACK SEA DURING HOLOCENE,
Woods Hole Oceanographic Institution, Mass.
W. G. Deuser.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 133-136, 1974. 3 fig, 14 ref. NSF Grant GA-1659.

Descriptors: *Density stratification, *Dissolved oxygen, *Water circulation, Salinity, Hydrogen sulfide, Water chemistry, Sea water.
Identifiers: *Black Sea, *Anoxic conditions.

The condition for oxygen depletion in the Black Sea was established 9,000 years ago, when significant influx of Mediterranean water through the Bosporous began to develop density stratification in the basin. If a logarithmically decreasing rate of oxygen consumption is assumed, a 'decay' constant for the oxygen reservoir can be calculated, corresponding to a half life of 1,800 years. With the aid of this constant and curves of the distribution of volume and area versus depth, the rise of the 02-H2S interface and the growth of the anoxic water in terms of occupied volume and bottom area can be calculated. In agreement with observations, the calculations show that anoxic conditions began in the deepest part of the basin about 7,300 years ago and that the interface has continued to rise slowly in the recent past. (Knapp-USGS)
W74-12375

DISTRIBUTION OF SOME TRACE ELEMENTS IN BLACK SEA AND THEIR FLUX BETWEEN DISSOLVED AND PARTICULATE PHASES,
Woods Hole Oceanographic Institution, Mass.
P. G. Brewer, and D. W. Spencer.
In: The Black Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 137-143, 1974. 12 fig, 3 tab, 16 ref. USAEC Contract AT (30-1)-4150 and NSF Grants GA-13574 and GA-1659.

Descriptors: *Water chemistry, *Density stratification, *Sulfides, *Dissolved oxygen, *Trace elements, Bottom sediments, Suspended load, Geochemistry, Advection.
Identifiers: *Black Sea, *Pycnocline.

The trace-element geochemistry of the Black Sea is dominated by the strong pycnocline separating the oxygenated and reducing environments. Using values of the vertical advective velocity and vertical eddy-diffusion coefficient derived from a model, the flux of dissolved sulfide, manganese, iron, copper, and zinc through this interface was estimated. The calculated sulfide flux is smaller than estimates of sulfide production in the sediments by a factor of four, but is consistent with estimates of chemosynthesis, suggesting that a sulfide-removal mechanism must operate. From the manganese data, it was estimated that about 78 percent of the detrital load of rivers entering the Black Sea is deposited near the mouths of the rivers and only 22 percent is spread over the surface of the Black Sea. If the mean sinking rate is 1,000 m/year, the data on the distribution and elemental composition of particulate matter in the

Black Sea are in agreement with estimates of river input. (KnappnUSGS)
W74-12376

PHOSPHORUS IN BLACK SEA,
Fishery Board of Sweden, Gotenburg. Hydrographic Dept.
S. H. Fonselius.
In: The Black-Sea--Geology, Chemistry, and Biology; Degens, E.T., and Ross, D.A., editors: American Association of Petroleum Geologists, Tulsa, Oklahoma, Memoir 20, p 144-150, 1974. 7 fig, 3 tab, 15 ref.

Descriptors: *Phosphorus, *Water chemistry, Dissolved oxygen, Density stratification, Water balance, Nutrients, Water analysis, Sampling.
Identifiers: *Black Sea.

The concentrations of inorganic phosphorus and total phosphorus in the Black Sea were measured during the cruise of the R/V Atlantis II. organic phosphorus was determined from the difference between total and inorganic phosphorus. Detailed studies were made of the distribution of phosphorus through the halocline and close to the bottom of the central deep-sea basin. By use of a model of the water balance of the Black Sea, a crude phosphorus balance model was constructed. About 6,7000 tons/year of phosphorus must be added to the Black Sea sediments in order for the phosphorus concentration to remain at a constant level. (Knapp-USGS)
W74-12377

RELATION BETWEEN CHLORINITY AND CONDUCTOMETRIC SALINITY IN BLACK SEA WATER,
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 2K.
W74-12378

SOME CHARACTERISTICS OF CARBONATE SEDIMENTATION IN BLACK SEA,
Akademiya Nauk SSSR, Gelendzhik. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-12383

MASS PHYSICAL PROPERTIES OF SOME WESTERN BLACK SEA SEDIMENTS,
National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Lab.
For primary bibliographic entry see Field 2J.
W74-12385

GEOCHEMISTRY OF SEDIMENTS FROM ELEVEN BLACK SEA CORES,
Durham Univ. (England). Dept. of Geochemistry.
For primary bibliographic entry see Field 2J.
W74-12387

INFLUENCE OF ORGANIC MATERIAL AND PROCESSES OF SULFIDE FORMATION ON DISTRIBUTION OF SOME TRACE ELEMENTS IN DEEP-WATER SEDIMENTS OF BLACK SEA,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 2K.
W74-12388

ORGANIC ANALYSES OF BLACK SEA CORES,
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 2J.
W74-12389

BEHAVIOR OF MOLYBDENUM IN PROCESSES OF SEDIMENT FORMATION AND DIAGENESIS IN BLACK SEA,
Akademiya Nauk SSSR, Gelendzhik. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-12391

METHYLMERCURY COMPLEXES IN AQUATIC SYSTEMS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
R. G. Zepp, G. L. Baughman, N. L. Wolfe, and D. M. Cline.
Environmental Letters, Vol 6, No 2, p 117-127, 1974. 4 fig, 3 tab, 20 ref.

Descriptors: *Mercury, *Organic compounds, *Aquatic environment, Proteins, Amino acids, Sulfur compounds, Sorption, Water pollution sources.
Identifiers: *Methylmercury.

Equilibrium calculations indicated that methylmurcuric ion is almost completely complexed under conditions that exist in fresh waters, and the sulfur bonded complexes are likely to be the predominant forms of methylmercury in fresh natural waters. Calculations are presented concerned with the extent and nature of such complexations. The following conclusions were derived: (1) methylmercury ion makes up only an extremely small fraction of the total dissolved methylmercury in the aquatic environment. Essentially all of the methylmercury exists as various complexes, whose nature strongly depends upon pH and the concentrations of the complexing species; (2) common chemical species such as orthophosphate, ammonia, phenolic groups, and protein amino groups have little effect upon complexation of methylmercury; (3) calculations indicate that methylmercury can be freed from sulfur-bonded complexes by strong acidification or addition of high concentrations of halide ions; (4) sulfur-bonded methylmercuric complexes are likely to be very important in the aquatic environment. Trace concentrations of reduced sulfur species or thiols are sufficient to quantitatively complex methylmercury even with much higher concentrations of other chemical species present. (Jernigan-Vanderbilt)
W74-12480

METALLIC POLLUTANTS MONITORED BY ATOMIC ABSORPTION.
For primary bibliographic entry see Field 5A.
W74-12486

URINARY LOW-MOLECULAR-WEIGHT PROTEINS IN ITAI-ITAI DISEASE,
Gunma Univ., Maebashi(Japan). Dept. of Hygiene.
For primary bibliographic entry see Field 5C.
W74-12490

MERCURY POISONING TAKES ITS TOLL IN JAPANESE FISHERMEN AND FAMILIES,
For primary bibliographic entry see Field 5C.
W74-12491

CADMIUM IN THE ENVIRONMENT, II,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
L. Friberg, M. Piscator, G. Nordberg, and T. Kjellstrom.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-221 198, $6.00 in paper copy; $2.25 in microfiche. February, 1973. 147 p, 2 fig, 19 tab, 191 ref. 68-02-0342.

Descriptors: *Trace elements, *Cadmium, *Toxicity, Exposure, *Analytical techniques, Air pollution, Weathering, Metabolism, Absorption, Urine, Public health, Human pathology, Epidemiology, Distribution.
Identifiers: Dose-response, *Japan, *Itai-Itai disease.

An update of an earlier review this presentation focuses upon information essential to the understanding of the toxic action of cadmium and the relationship between exposure and effects on human beings and animals. Information is reviewed about the following aspects of cadmium: (1) analytical methods of measuring cadmium; (2) occurrence, possible routes of exposure and daily intake; (3) matabolism, including uptake and absorption, transport, distribution and excretion of cadmium in animals, and in normal and exposed human beings; (4) relationships among concentrations of cadmium in blood, urine and organs, and Metallothionein; (5) effects and dose-response relationships on bone, and liver, renal effects; (6) epidemiological investigations in cadmium-polluted areas of Japan including methodology and cadmium exposure and medical effects in individual areas; (7) the cause of the Itai-Itai disease. (Jernigan-Vanderbilt)
W74-12492

BIOLOGICAL DIFFERENCES IN CADMIUM AND ZINC TURNOVER,
Oklahoma Univ., Oklahoma City. Dept. of Environmental Health.
For primary bibliographic entry see Field 5C.
W74-12493

MATERNAL-FETAL TRANSFER OF ORGANIC AND INORGANIC MERCURY VIA PLACENTA AND MILK,
Vanderbilt University, Nashville, Tennessee.
M. M. Mansour, N. C. Dyer, L. H. Hoffman, A. R. Schulert, and A. B. Brill.
Environmental Research, Vol 6, No 4, p 479-484, December, 1973. 2 fig, 4 tab, 6 ref. NSF (GI-30015) USAEC(AT-(40-1)-2401).

Descriptors: Transfer, *Mercury, *Rodents, *Tracers, *Milk, Animal physiology, Organic compounds, Inorganic compounds, Laboratory tests, Laboratory animals, Testing procedures, Analytical techniques, Distribution, Path of pollutants.
Identifiers: *Methylmercury.

The maternal-fetal transfer or organic and inorganic mercury across the placenta and through mother's milk has been investigated in the rat. Organic mercury is more readily transferable across the placenta than inorganic mercury. However, both forms of mercury were transferred through milk with approximately the same efficiency. The mercury concentrations in the placenta and the infant hair are directly related to the infant's body burden of mercury. (Jernigan-Vanderbilt)
W74-12495

DETERMINATION OF TRACE ELEMENTS IN COAL, FLY ASH, FUEL OIL, AND GASOLINE-A PRELIMINARY COMPARISON OF SELECTED ANALYTICAL TECHNIQUES,
National Environmental Research Center, Research Triangle Park, N.C. Quality Assurance and Environmental Monitoring Lab.
For primary bibliographic entry see Field 5A.
W74-12500

DETERMINATION OF SOLUBLE CADMIUM, LEAD, SILVER, AND INDIUM IN RAINWATER AND STREAM WATER WITH THE USE OF FLAMELESS ATOMIC ABSORPTION,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5A.
W74-12501

RETENTION OF TWO MERCURIALS BY STRIPED MULLET, MUGIL CEPHALUS,
National Marine Water Quality Lab., Johns Island, S.C.
D. P. Middaugh, and C. L. Rose.
Water Research, Vol 8, No 3, p 173-177, March, 1974. 5 tab, 13 ref.

Descriptors: *Mercury, *Mullets, *Organic compounds, *Inorganic compounds, *Path of pollutants, Toxicity, Seawater, Laboratory tests, Laboratory animals, Testing procedures, Analytical techniques, Animal physiology.

The uptake and retention of phenyl mercuric nitrate (PMN) and mercuric chloride (HgCl2) were studied in Mugil cephalus, the common saltwater mullet. Fish were exposed to calculated doses of 10, 50, 100 and 500 parts per billion (ppb) mercury of each toxicant in seawater for three hours. Thereafter, they were held in tanks with flowing seawater for 216h. Fish were sacrificed at 72-h intervals during holding period to determine levels of mercury in gill, liver and muscle tissues. Higher mercury levels were found in mullet exposed to PMN than in those exposed to equivalent concentrations of HgCl2. No deaths occurred among mullet dosed with HgCl2 whereas 58 per cent of those exposed to the highest level of PMN died within 21h of exposure. Mercury levels detected in tissues appeared to be related to the toxicant used, dose levels, and time of sampling after exposure. (Jernigan-Vanderbilt)
W74-12504

COMPARISON OF CADMIUM 115M RETENTION IN RATS FOLLOWING DIFFERENT ROUTES OF ADMINISTRATION,
National Water Quality Lab., Cincinnati, Ohio. Newtown Fish Toxicology Lab.
W. Moore, Jr., J. F. Stara, W. C. Crocker, M. Malanchuk, and R. Iltis.
Environmental Research, Vol 6, No 4, p 473-478, December, 1973. 1 fig, 1 tab, 11 ref.

Descriptors: *Cadmium, *Rodents, *Absorption, *Animal physiology, Retention, Trace elements, Laboratory tests, Laboratory animals, Testing procedures, Analytical techniques, Spectroscopy, *Radioisotopes, Path of pollutants.

Whole body retention studies of Cd 115m were carried out on rates following four different routes of administration: oral, inhalation, intraperitoneal, and intravenous. The retention curve for each route of administration was divided into two components. The first component reflected the initial rapid clearance of Cd 115m primarily by the gastrointestinal tract and the second component indicated the absorption and turnover of Cd 115m. Extrapolation of the second component to the intercept gave initial absorption values of 93%, 91%, 41% and 2.3% for intraperitoneal, intravenous, inhalation, and oral routes, respectively. Immediately after inhalation exposure, 9.7% of the total inhaled Cd was present in the lungs. The route of administration did not significantly influence the rate of elimination and biological half-life of the second component of the whole body retention curve. (Jernigan-Vanderbilt)
W74-12505

METAL CONTAMINATION OF URBAN WOODY PLANTS,
Yale Univ., New Haven, Conn. School of Forestry and Environmental Studies.
W. H. Smith.
Environmental Science and Technology, Vol 7, No 7, p 631-636, July, 1973. 4 tab, 46 ref. RSA-71-20.

Descriptors: *Plant tissues, *Heavy metals, *Connecticut, *Spectrophotometry, Distribution, Cities, Rural areas, Trace elements, Statistical analysis, *Path of pollutants, Pollutant identification, *Air pollution effects, *Lead.
Identifiers: Atomic absorption spectrophotometry.

During the fall, 1970, leaf and twig tissue representing the growth of the previous growing season was collected from six woody plant species throughout the city of New Haven. Sugar maple was also sampled from remote northern New Hampshire and Vermont. These tissues were analyzed for Al, Cd, Cr, Co, Cu, Fe, Pb, Mn, Ni, Na, Sn, Zn, and V by atomic absorption spectrophotometry. Co and Sn were not detected. V was present in only a few samples from two city species. All other metals were found in all New Haven woody plants and in the sugar maples from remote areas. Cd, Cu, and Mn were present in 'normal' amounts. Al, Cr, and Ni were present in 'slightly above' normal amounts. Fe, Pb, Na, and Zn were present in 'above normal' amounts. The mean Pb concentrations exceeded most Pb concentrations determined for trees in areas with geologic Pb deposits or adjacent to primary highways. Washing and analysis with an electron microprobe failed to provide conclusive evidence with regard to the specific location of the Pb on or in the tissue sampled. (Rowe-Vanderbilt)
W74-12506

MERCURY CONCENTRATION IN THE WATER, SEDIMENTS AND FAUNA OF AN AREA OF THE TYRRHENIAN COAST,
Siena Univ. (Italy). Inst. of Comparative Anatomy.
A. Renzoni, E. Bacci, and L. Falciai.
Revue Internationale d'Oceanographie Medicale Vol 31-32, p 17-45, 1973. 6 fig, 8 tab, 43 ref.

Descriptors: *Mercury, *Water pollution sources, *Sediments, *Marine animals, Aquatic life, Distribution, Analytical techniques, *Spectroscopy, Sea water, Industrial wastes, Benthic fauna, Pollutant identification.
Identifiers: *Italy(Tyrrhenian coast), Atomic absorption spectrometry.

Mercury concentrations found in the bodies of 21 of the most common species of 4 Phyla off the Tuscan coast were studied by atomic absorption spectroscopy. The study was made in 1972-73 near the site where a chloralkali factory dumps wastes which contain mercury. Samples of water and sediments were also collected and tested for mercury concentrations. Findings were as follows: the presence of high concentrations of mercury in the water of a larger area than had been thought, reaching values as high as 204 ng/l in the most polluted station; evidence of a relationship between the mercury concentration and the size of the sediment granules; great differences in mercury content between animals and different phyla, and, within the same phylum, between groups and species; great variations in mercury concentration in different tissues of the same specimen, with consistently higher values in the visceral organs than in the muscles in all specimens of all studied species; an evident mercury accumulation in the white muscle of the small-scaled sea-scorpion; no evident mercury accumulation in the foot muscle of the limpet. (Rowe-Vanderbilt)
W74-12509

ZINC, COPPER, MANGANESE IN THE RAZOR CLAM, SILIQUA PATULA,
Oregon State Univ., Corvallis. Dept. of Oceanography.
J. D. Gile.
Available from the National Technical Information Service, Springfield, Va 22161 as RLO-2227-T12-34, $3.00 in paper copy, $2.25 in microfiche. M Sc Thesis, June, 1972, 52 p. 25 fig, 11 tab, 35 ref, append. (Report RLO-2227-T-12-34).

Descriptors: *Trace metals, *Clams, *Zinc, *Copper, *Manganese, Variability, Aquatic life, Analytical techniques, Spectroscopy, On-site data collections, Animal physiology, Animal metabolism, *Washington, *Oregon.
Identifiers: Siliqua patula.

Zinc, copper and manganese concentrations were measured by atomic absorption spectroscopy in Siliqua patula collected during May, 1970 through May, 1971. Individual clams were analyzed to determine the degree of variation among individuals. Statistical analysis proved the variation to be highly significant. Monthly composite samples of 18 clams were collected from three sites along the Washington-Oregon coast. The samples were analyzed to examine differences in concentration among two general groups of tissue, collection sites and monthly concentrations within a site. Copper and manganese were consistently higher in portion B (gills, liver, digestive system and reproductive tissue) and zinc was generally higher in portion A (foot, neck, mantle, adductor muscle and reproductive tissue). Variation among the three sites appears to reflect only the high degree of variability among individuals. There appeared to be a general trend of increasing concentration in Spring and Summer for all three elements. The increased concentration in Spring and Summer may be a response to increased requirements due to changes in metabolic rate brought about by increased growth and reproductive activity. Monthly variation also could be reflecting the variation among individuals. (Jernigan-Vanderbilt)
W74-12511

METALS COORDINATED BY LIGANDS NORMALLY FOUND IN NATURAL WATERS,
Haile Sellassie I Univ., Addis Abba (Ethiopia).
L. R. Pittwell.
Journal of Hydrology, Vol 21, No 3, p 301-304, March, 1974. 1 tab, 3 ref.

Descriptors: *Heavy metals, Rivers, *Carbonates, *Chlorides, *Fluorides, Solubility, Hydrogen ion concentration, Water pollution sources.
Identifiers: *Ligands.

Water, carbonate, chloride and fluoride are the main ligands responsible for keeping metals in solution in natural waters. Metals are listed by ligands and the conditions under which they are likely to be kept in solution are presented. The question of specific organic ligands is dealt with very briefly. (Jernigan-Vanderbilt)
W74-12512

HOW TO TROUBLESHOOT FOR COPPER LOSS IN WATER-COOLED GENERATORS,
Florida Power Corp., St. Petersburg.
R. E. Carr.
Power, Vol 117, p 53-55, June, 1973. 2 fig.

Descriptors: *Copper, *Leakage, *Powerplants, *Water cooling, Testing procedures, On-site tests, Inspection, Measurement, Industrial plants, *Florida, Thermal pollution.
Identifiers: *Crystal River(Fla).

Copper loss from stators of generators at a power plant is monitored at the deionizer through which cooling water is routed, allowing simultaneous measurement of system copper concentration and dionizer performance. The three troubleshooting techniques used to study copper loss were: (1) plotting on annual graph paper the weekly copper test results along with other important values; (2) placing a manometer on the stator cooler vent system to monitor operation of the vent systems vacuum-break and pressure relief valves with hourly readings for 6 days; and (3) researching the possible corrosion reactions for copper. Parameters deemed important for weekly measurement besides copper were pH, water-system makeup, operating service pump, and resin material. Oxygen was believed to be a main contributor to copper loss in the stator cooler system. That conclusion was based on manometer readings taken on the water storage tank vent system. Based on the results of the troubleshooting techniques, it was proposed that the vent system pressure-relief

and vacuum break valves have independent piping, with the vacuum break done through a water-seal tank. (Jernigan-Vanderbilt)
W74-12514

LEAD CONCENTRATIONS IN THE WOOLY SCULPIN CLINOCOTTUS ANALIS, COLLECTED FROM TIDEPOOLS OF CALIFORNIA,
California Univ., Los Angeles. Dept. of Biology.
W. P. Alley, H. R. Brown, and L. Y. Kawasaki.
California Department of Fish and Game, Fisheries Bulletin, Vol 60, No 1, p 50-51, January, 1974. 4 ref.

Descriptors: *Lead, Aquatic life, *Fish, *Tidal waters, Analytical techniques, Spectroscopy, Air pollution, *California, *Sculpins, *Path of pollutants.

The lead concentration in the muscle tissue of the wooly sculpin, Clinocottus analis, was examined for 30 fishes collected in tidepools in Southern California. The average lead values of the sculpins taken at Pt. Fermin was 4.9 ppm while the average lead level of sculpins collected at the isthmus of Santa Catalina Island was 2.7 ppm. The average lead concentrations for sculpins removed from north of San Simeon was only 0.6 ppm. The geographical variations (4.9 ppm in one area, 2.7 in another and 0.6 in a third) in lead levels undoubtedly reflect the contamination of the intertidal zone by atmospheric lead pollution. The least contaminated region easily qualifies as a rural area in that it is removed from any major metropolitan area and has not major highways passing through it. The other two areas lie close enough to Los Angeles to receive some of its atmospheric pollution. This conclusion is supported by the fact that the lead concentrations of the tidepool fishes of the area farther away are about half as great as those nearest Los Angeles but more than four times greater than the rural area. (Jernigan-Vanderbilt)
W74-12515

UNIVERSITY OF TORONTO STUDIES REVEAL TOXIC METALS IN SLUDGES USED FOR SOILS.
Water and Sewage Works, Vol 120, No 7, p 50-52, July, 1973. 3 tab.

Descriptors: *Cadmium, *Lead, *Sewage sludge, *Fertilizers, *Toxicity, Public health, Laboratory tests, Analytical techniques, Spectroscopy, Heavy metals, *Canada, Soil contamination, Path of pollutants, Runoff.

Recent findings at the University of Toronto indicate alarming amounts of cadmium and lead present in sewage sludge used as fertilizers for food crops. These metals may be assimilated by crops in amounts harmful to human and animal health. Jon Van Loon, an analytical chemist and professor of geology and chemistry at the university, has been examining the metallic contents of sewage sludges from treatment plants in Toronto and surrounding Ontario provinces. Van Loon and his associates examined plant life that has been grown on fields, with and without the addition of sludges. They were especially interested in cadmium and lead. Samples (measured by atomic absorption spectroscopy) were taken from three plants representing vastly different sewage influents: sewage from heavy industry region showed heavy metal values for all the elements studied; metals were low in the sewage from the residential community; high chromium content was found in the third region which contained industries which made extensive use of chrome. Van Loon sees the ground water runoff threat to water supplies as a potentially great one, in view of the fact that metals contents in fields will increase over the years. (Jernigan-Vanderbilt)
W74-12516

COMPARTMENTAL ANALYSIS FOR THE EVALUATION OF BIOLOGICAL HALF-LIVES OF CADMIUM AND MERCURY IN MOUSE ORGANS,
Tokyo Univ. (Japan). School of Health Sciences.
J. Matsubara-Khan.
Environmental Research, Vol 7, No 1, p 54-67, February, 1974. 5 fig, 3 tab, 32 ref.

Descriptors: *Cadmium, *Mercury, *Rodents, Distribution, *Mathematical models, Biology, Analytical techniques, Laboratory tests, Inorganic compounds, *Radioisotopes.

Repeated observations on the quantitative behavior of Cd109 and Hg203 in various mouse organs after a single injection of these tracers revealed that a clear difference of turnover characteristics exists between these nuclides, as was quantitatively determined by the compartmental analysis using electronic computer HITAC 5020. Loss patterns of Cd109 in liver, kidney, and salivary gland fitted the two-compartment model. In each organ fast and slow biological half-lives were obtained from the two observed rate constants. Data from gastrointestinal tissues or contents conformed with the one-compartment model. Loss patterns of Hg203 in most mouse organs, except brain, fitted the one-compartment model with larger rate constants which were more than 10-fold those of Cd109. By comparing the parameters obtained in the fitted exponential functions for various organs, it was possible to define the interrelationship of the metabolic flow of the elements in the different organs. In the cadmium study data from kidneys, livers, and salivary glands of subcutaneously injected animals were obtained which gave a common value for the parameter reflecting the pool size. Rate constants in kidneys and salivary glands were very small thus giving extremely long biological half-lives. Decay pattern of Cd109 for the whole body was also examined in detail. (Jernigan-Vanderbilt)
W74-12520

A METHOD TO MONITOR THE EFFECTS OF TOXICANTS UPON BREATHING RATE OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES LACEPEDE),
National Inst. for Water Research, Pretoria, (South Africa); and Council for Scientific and Industrial Research, Pretoria (South Africa).
For primary bibliographic entry see Field 5C.
W74-12522

UNRECORDED POLLUTION FROM URBAN RUNOFF,
Rutgers-The State Univ., New Brunswick, N. J., Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W74-12523

WHAT EXPLORATION GEOLOGISTS SHOULD KNOW ABOUT POLLUTION,
Texas Univ., Austin. Center for Research in Water Resources.
E. F. Gloyna.
In: Oil and Water--A Symposium, Bureau of Economic Geology, Texas University, Austin, Texas, January 29, 1965. p 25-32, (1965). 4 fig, 2 ref.

Descriptors: *Groundwater, Potable water, Economics, Public health, Water pollution, Pollution abatement, Wastes, Water pollution control, Water pollution effects, Water pollution treatment, Water quality, *Recycling, Effluents, Waste water(Pollution), Waste water disposal, Sewage disposal, Sewage bacteria, Bacteria, Coliforms, Conservation, Biochemical oxygen demand.
Identifiers: Effluent quality, *Exploration geologists.

When measured in terms of weight, water is by far the greatest resource used by man. Use per capita in the United States is greater by a large factor than all other resource uses combined. The dependency of the Southwest upon production processes and the use of great quantities of water is especially important. From now on water needs can best be met by controlling pollution. Water resources management must permit and even direct repeated reuse of the same water. This water may be diluted with relatively pure water as it flows from city to city, from industry to industry, from surface streams to underground formations, from agricultural lands to streams, from wastewater treatment plants to recreational facilities. In essence, water, the vital raw material, must be available in sufficient quantity and usable quality for purposes of furthering the state's affluent society. (Campbell-NWWA)
W74-12548

SIMULATION OF THE DIFFUSION OF DISSOLVED SALTS IN AQUIFERS,
California Univ., Los Angeles. School of Engineering and Applied Science.
J. A. Dracup, and W. J. Karplus.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 076; $3.00 in paper copy, $2.25 in microfiche. Completion Report, (February, 1974). 7 p, 15 ref, (California Water Resources Center Project UCAL-WRC-W-340). OWRT-B-150-CAL(14).

Descriptors: *Programming languages, *Simulation analysis, Waste water treatment, Mathematical models, Model studies, *California, *Diffusion, *Dissolved solids, Salts, Aquifers, Waste assimilative capacity, *Path of pollutants, Optimal development plans.
Identifiers: Whittier Narrows(Calif), Santee Water Reclamation Projects(Calif).

Digital simulation tools for the study of hydrologic surface water and groundwater systems have been developed. The partial differential equation language PDEL was expanded and extended to facilitate the treatment of these problem areas. PDEL is a higher-level language permitting a user untrained in computer programming to formulate and express his mathematical model in easy-to-learn formal statements. The PDEL translator then converts this program into P1/1 for further manipulation and eventual execution. A mathematical model to optimize the assimilative waste capacity of unconfined aquifers was formulated. The aquifer is used conjunctively with surface water supply sources. The waste waters are introduced into the ground water aquifer system by either well injection or by basin spreading. The model was applied to a ground water basin using data from the Whittier Narrows and Santee Water Reclamation Projects. Optimal decisions are made regarding the capacity of the waste treatment plant, the unit processes of the treatment plant, and the volume of the dilution water. (Snyder-California, Davis)
W74-12594

THE QUANTITY AND MOVEMENT OF NITRATES IN SOIL WATER IN TWO CONNECTICUT SOILS TREATED WITH HIGH AND LOW LEVELS OF INORGANIC NITROGEN FERTILIZER,
Connecticut Univ., Storrs. Inst. of Water Resources.
G. F. Griffin, and R. W. Wengel.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 072; $3.00 in paper copy, $2.25 in microfiche. Completion Report, 1974. 17 p, 2 fig, 6 tab. OWRT A-029-CONN(2). OWRR 14-31-0001-3807.

Descriptors: *Nitrates, *Soil water movement, Soil types, *Soil-water-plant relationships, Groundwater, *Fertilizers, Hardpan, Leaching, Sampling, *Path of pollutants, Corn(Field).
Identifiers: *Fragipan soils, Non-fragipan soils, Nitrate movement, Nitrate accumulation, Inor-

ganic nitrogen fertilizer, Potential groundwater pollution.

The quantity and movement of soil water nitrates in both a fragipan and non-fragipan soil were studied on corn land with and without added nitrogen fertilization. Particular attention was directed to determining nitrate movement along the fragipan surface, which occurs at a depth of two feet in this soil. In the three years of study no lateral movement of nitrate was detected, but movement into the fragipan was shown. Soil water nitrates attributable to field fertilization prior to the start of this study were detected at depths of two and four feet in the fragipan soil and influenced the first year results. Corn, grown for silage, reduced soil nitrate levels by the end of the growing season to levels considered safe for drinking water. (deLara-Connecticut)
W74-12595

OIL SPILLS: HOW SERIOUS A PROBLEM.
Journal Water Pollution Control Federation, Vol 45, No 4, p 583-585, April, 1973. 3 p.

Descriptors: *Oil wastes, *Oily water, *Water pollution control, *Water pollution effects, *Water pollution sources, Oil, Chemical wastes, Ships, Water law, Water quality control, Water Quality Act, Gasoline, Pollutants, Legislation, Administrative agencies, Project planning, Water policy, Project purposes, Adoption of practices, Administration, Oil pollution, Pollution treatment, Federal government.

The Conference on the Prevention and Control of Oil Spills contrasts the opposing views on the seriousness of the problem of oil spills. One side asserts that the danger of the spills has been grossly exaggerated. Environmentalists caution that over 80 percent of oil spilled at sea remains in the marine environment for an indefinite period even after cleanup efforts are complete. Most information about the adverse effects of oil spills is based on major reported pollution spill incidents. About 200,000 tons of oil are spilled a year from seagoing tankers. Most oil spill incidents are the result of groundings not collisions. Groundings accounted for three and one-half times more oil spilled than collisions. There is no clear correlation between tanker size and oil spill frequency. Because of its worldwide impact, the problem of tanker spills is receiving international attention. The United Nations Maritime Safety Committee has drafted proposed preventive measures against spills. A national program for oil spill control will be launched and will include regulations setting requirements for spill reporting and contingency planning with penalties and liabilities set out for infringers of the regulations. (Kelly-Florida)
W74-12621

APPLICATION OF ERTS-1 DATA TO THE PROTECTION AND MANAGEMENT OF NEW JERSEY'S COASTAL ENVIRONMENT,
Earth Satellite Corp., Washington, D.C.
For primary bibliographic entry see Field 2L.
W74-12639

GROUNDWATER POLLUTION IN THE VICINITY OF TOLEDO BEND RESERVOIR, TEXAS,
Geological Survey, Austin, Tex.
E. T. Baker, Jr., and J. Rawson.
Open-file report, March 1974. 54 p, 12 fig, 5 tab, 6 ref.

Descriptors: *Water pollution sources, *Reservoirs, *Groundwater, *Septic tanks, *Texas, Soil disposal fields, Coliforms, Bacteria, Water quality, Path of pollutants, *Louisiana.
Identifiers: *Toledo Bend Reservoir(Tex-La).

Pollution of water in the Toledo Bend reservoir, Texas and Louisiana, by the infiltration of sewage effluent into the shallow groundwater and then into the reservoir was studied by determining the bacteriological and chemical quality of the shallow groundwater and the general direction of groundwater movement in the area bordering the Texas side of the reservoir. During the period from March 1972 to March 1973, at least 1 sample from 19 of the 22 test wells contained coliforms, and at least 1 sample from 16 wells contained more than 1,000 coliform colonies per 100 milliliters. At least 1 sample from 8 of the 22 test wells contained fecal coliforms. Samples from 2 wells contained more than 100 fecal-coliform colonies per 100 milliliters. At least 1 sample from 12 of the 22 wells contained streptococci. Samples from six wells contained both streptococci and fecal coliforms. Most of the monitoring sites where fecal coliforms were detected in the groundwater are at commercial developments. The probable source of the pollution is effluent from the septic tanks. The low densities of fecal coliforms and streptococci in water from most of the wells indicate that the pollutants contributed to the shallow groundwater and thence to Toledo Bend Reservoir by effluent from the septic-tank systems are also low. However, if development in the reservoir area continues at a rapid pace and septic tanks are used for the disposal of wastes, the pollution level can be expected to increase rapidly in some areas. (Knapp-USGS)
W74-12641

RELATION OF CLIMATE TO LEACHING OF SOLUTES AND POLLUTANTS THROUGH SOILS,
Wisconsin Univ., Madison. Dept. of Soil Science.
C. B. Tanner, and W. R. Gardner.
Available from NTIS, Springfield, Va. 22161 as COM-73-11225, Price $4.25 printed copy, $2.25 microfiche. Report to National Oceanic and Atmospheric Administration, Environmental Data Service, June 5, 1973. 48 p, 12 fig, 12 tab, 26 ref. NOAA Grant NG-34-72.

Descriptors: *Leaching, *Path of pollutants, *Irrigation effects, *Nitrates, Soil water movement, Translocation, Climatology, Weather data, Evapotranspiration, *Climates.

For subhumid and semiarid regions a simple model of nitrate leaching was combined with an analysis of weather records to give a construction of annual nitrate peaks in deep soil profiles and the rate at which the nitrate moves to the water table. The model is applicable to humid as well as arid regions. However, the annual nitrate peaks are so widely spaced in humid regions and groundwater tables often are so close to the surface that soil coring would not be definitive. Therefore lysimeter data are required in humid regions. (Knapp-USGS)
W74-12645

PHOTOSYNTHETIC RECLAMATION OF AGRICULTURAL SOLID AND LIQUID WASTES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 5D.
W74-12647

ASSESSMENT OF BIODEGRADATION POTENTIAL FOR CONTROLLING OIL SPILLS ON THE HIGH SEAS,
Oklahoma State Univ., Stillwater. Dept. of Biochemistry.
For primary bibliographic entry see Field 5G.
W74-12649

ARGILLIZATION BY DESCENDING ACID AT STEAMBOAT SPRINGS, NEVADA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2K.
W74-12651

HEALTH HAZARDS OF THE HUMAN ENVIRONMENT.
World Health Organization: Geneva, Switzerland, 1972. 387 p. Illus. Paper. Pr. $11.00.

Descriptors: *Public health, Air pollution, Water pollution, *Diseases, Ecology, Soil contamination, Pesticides, Radiation, *Environment, Hazards.
Identifiers: Carcinogens, Teratogens.

A summary is presented of current knowledge of health hazards in the human environment. In part 1, environmental hazards are considered in relation to such environmental aspects as air, water, food, soil, land, home and place of work. Part 2, discusses specific chemical contaminants and physical hazards in the environment. Mutagens, carcinogens, teratogens and pesticides are included. The problems involved in interpreting laboratory tests are described. In part 3, the development of a world system of surveillance and monitoring of environmental factors affecting health is discussed. Environmental parameters, environmental radiation, communicable diseases, indices of nutritional status, congenital malformations, chromosome aberrations, biochemical profiles, adverse reactions to drugs, cancer, domestic and wild animals, and systems analysis and control are included. In part 4, measures for dealing with environmental health hazards are described. The development of general criteria and standards is important. The role of basic sanitation in solving many problems in the control of communicable diseases and some indications of the ways in which advanced technology could be used for controlling certain pollutants and nuisances are discussed. The book will interest environmentalists, ecologists and anyone interested in environmental problems.--Copyright 1973, Biological Abstracts, Inc.
W74-12679

ENVIRONMENTAL POLLUTION BY FLUORINE WITH RESPECT TO THE PROSPECTIVE ALUMINUM FACTORIES IN KYUSHU, JAPAN (IN JAPANESE),
Kagoshima Univ. (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W74-12680

LEPTOSPIROSIS: AN EPIDEMIC IN CHILDREN,
Center for Disease Control, Atlanta, Ga. Epidemiology Program.
For primary bibliographic entry see Field 5C.
W74-12685

A STUDY OF BACTERIAL MIGRATION IN IRRIGATED SOILS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
V. A. Emel'Yanov, O. V. Zdorik, N. I. Zerbin, and A. V. Pendin.
S-Kh Biol. Vol 8, No 4, p 607-610. Illus. 1973. English summary.
Identifiers: Bacterial migration, Soils(Irrigated), *E. coli, *USSR(Hungry steppe), *Serozem soils, *Path of pollutants.

A method was divised to study bacterial migration, using Escherichia coli as the study organism. A serozem soil of the Hungry steppe (USSR) was studied.--Copyright 1974, Biological Abstracts, Inc.
W74-12704

NUTRIENT ENRICHMENT OF NATURAL WATERS,
Soil Conservation Service, Washington, D.C.
A. A. Klingebiel.
Qual Plant Mater Veg. Vol 22, No 3/4, p 223-248. 1973. Illus.

Descriptors: *Natural streams, Water pollution, Soil moisture, Soil water, Moisture content, Soil water movement, Water loss, Runoff, Surface runoff, Erosion, *Nutrients, Maps.
Identifiers: Soil maps.

Evidence is presented to show the numerous sources of nutrient enrichment of natural waters. Factors affecting soil and water losses and their relationship to water pollution are discussed. The value and use of soil maps in predicting potential areas of water pollution from runoff and erosion is discussed. Small scale maps of the world are used to show how soil maps can be interpreted and used.--Copyright 1974, Biological Abstracts, Inc.
W74-12709

REASONS FOR CRITICISM OF THE SYSTEM OF SAPROBIONTS,
Polskie Towarzystwo Przyrodnikow im Kopernika, Warsaw.
L. Turoboyski.
Kosmos (Warsaw). Vol 22, No 1, p 39-42. 1973.
Identifiers: *Saprobionts, Rivers, Biocenoses, Water pollution.

River water pollution and the resulting unnatural changes in biocenoses of surface waters made it necessary to reconsider the system of saprobionts. A list of index organisms divided into saprophobes, saproxenies, saprophils and saprobionts has been worked out; but this list needs to be continually readjusted to increasing pollution.--Copyright 1974, Biological Abstracts, Inc.
W74-12711

LOSSES OF NITROGEN AND OTHER PLANT NUTRIENTS TO DRAINAGE FROM SOIL UNDER GRASS,
Grassland Research Inst., Hurley (England).
E. A. Garwood, and K. C. Tyson.
J Agric Sci. Vol 80, No 2, p 303-312, 1973.

Descriptors: *Transpiration, Lysimeters, Nitrates, Runoff, *Grasses, *Perennial ryegrass, Drainage, Leaching, *Nitrogen, Nutrients.
Identifiers: Grass, Plant, Potential, Soil.

Drainage lysimeters were used to estimate actual transpiration of a perennial ryegrass sward; this is compared with the calculated values for potential transpiration. Losses to drainage of NO3-N under differing levels of application of N fertilizer were examined. When 250 kh N/ha were applied annually, losses of NO3-N were negligible; when 500 kg N/ha were applied, up to 142.9 kg N/ha were lost to drainage. Concentration of NO3-N in the leachate with an application of 250 kg N/ha was low (1-5 ppm); with 500 kg N/ha the concentration ranged 10-109 ppm. Losses of NO3-N were particularly severe during winter following a dry autumn. When drainage occurred during the growing season losses were minimal. Concentrations and quantities of K, Ca, Mg, Na, P, Cl and S (as sulfate) leached were also examined.--Copyright 1973, Biological Abstracts, Inc.
W74-12723

SOIL MICROORGANISM METABOLISM IN SPRAY IRRIGATION,
North Texas State Univ., Denton.
For primary bibliographic entry see Field 5D.
W74-12725

LEISHMANIASIS IN BRAZIL: VI. OBSERVATIONS OF THE SEASONAL VARIATIONS OF LUTZOMYIA FLAVISCUTELLATA IN DIFFERENT TYPES OF FOREST AND ITS RELATIONSHIP TO ENZOOTIC RODENT LEISHMANIASIS (LEISHMANIA MEXICANA AMAZONENSIS),
Instituto Evandro Chagas, Belem (Brazil). Wellcome Parasitology Unit.
For primary bibliographic entry see Field 2I.
W74-12734

LEISHMANIASIS IN BRAZIL: VII. FURTHER OBSERVATIONS ON THE FEEDING HABITATS OF LUTZOMYIA FLAVISCUTELLATA (MANGABEIRA) WITH PARTICULAR REFERENCE TO ITS BITING HABITS AT DIFFERENT HEIGHTS,
Instituto Evandro Chagas, Belem (Brazil). Wellcome Parasitology Unit.
For primary bibliographic entry see Field 2I.
W74-12735

NITRATES, NITRITES; THEIR RELATIONSHIP TO ANIMALS, MAN: IV. FACTORS CAUSING A CONCENTRATION IN FODDER CROPS OF NITRATES, NITRITES: THEIR DEPENDENCE UPON ECOLOGICAL FACTORS; TIME OF STORAGE, (IN GERMAN),
Institut fuer Immunobiologie, Berlin (East Germany).
H. Liebenow.
Arch Tierernaehr. Vol 21, No 8/9, p 635-648. 1971. Illus. (English summary).
Identifiers: Beans, Beets, Cocksfoot, Crops, Ecological studies, Fodder, Grass, Maize, Meadow, *Nitrates, *Nitrites, Oats, Rye, Sunflower, Time, Vetches.

Over the experimental period from 1962-1967 the content of nitrates in the dry matter of irrigated grasses averaged 1.2% while that of non-irrigated grasses averaged 0.8%. The average values obtained for each of the 6 yr varied between 0.6% and 1.7% in the case of irrigated grass and ranged from 0.2%-1.4% in the case of non-irrigated grass. In the years 1964-1965 when high concentrations of nitrates were observed the percentage content of nitrates in irrigated grass obtained from a number of irrigation plots was found to be as high as 5.4% that of non-irrigated grass 3.1%. Ten different species of fodder crops which were grown in the years 1965-1967 on the average contained from 0.09%-1.2% of nitrates if the crops were under irrigation and from 0.09%-0.89% if the crops were not irrigated. The largest stores of nitrates were found in oats, sun-flower and fodder beets; smaller concentrations were contained in ryegrass, cocksfoot and stalked meadow grass while the smallest amounts of nitrates were found in maize, lucerne, vetches and fodder beans. Nitrites were found sporadically; the content of nitrites varied between 0.09 mg% and 11.6 mg% in irrigated grass and between 19.4 mg% and 301 mg% in sunflower. The following factors increased the nitrate content: cold weather, storage in stacks, drying between 80C and 120C resulting in a 11-24% increase.--Copyright 1973, Biological Abstracts, Inc.
W74-12741

5C. Effects Of Pollution

ENVIRONMENTAL IMPACT ANALYSIS: THE EXAMPLE OF THE PROPOSED TRANS-ALASKA PIPELINE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-12011

ECOLOGY OF TOXIC METALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12024

DISTRIBUTION, BIOLOGICAL EFFECTS, AND MIGRATION OF RADIOACTIVE ISOTOPES.
For primary bibliographic entry see Field 5B.
W74-12038

EFFECTS OF RADIOACTIVE STRONTIUM ON MICROFLORA OF WATER AND ON MINERALIZATION PROCESSES OF ORGANIC SUBSTANCES,
For primary bibliographic entry see Field 5D.
W74-12041

ACCUMULATION OF STRONTIUM-90 IN YOUNG CARP,
For primary bibliographic entry see Field 5B.
W74-12042

DISTRIBUTION, ELIMINATION, AND COEFFICIENTS OF ACCUMULATION OF STRONTIUM-90, CESIUM-137, AND PHOSPHORUS-32 IN FISH,
For primary bibliographic entry see Field 5B.
W74-12043

A SURVEY OF UNIQUE TECHNICAL FEATURES OF THE FLOATING NUCLEAR POWER PLANT CONCEPT.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va 22161 as Rept No WASH-1304; $5.45/copy, $2.25/microfiche. Report No WASH-1304, March 1974. 111 p, 2 fig, 4 tab, 13 ref.

Descriptors: *Nuclear powerplants, Floating, *Oceans, *Sites, *Safety, Evaluation, *Surveys, Offshore platforms, Environmental effects, Accidents, Hazards, Transportation.
Identifiers: *Floating nuclear powerplants.

The manufacture, installation, operation, and decommissioning of floating nuclear power plants at offshore sites are examined with respect to the major technical differences between such plants and land-based nuclear power plants. Anticipated environmental effects of activities associated with offshore nuclear plants are discussed. Possible accidents, both inplant and during the transport of radioactive materials to and from an offshore plant, are described and an initial estimate of their relative significance presented. (Houser-ORNL)
W74-12045

TEMPERATURE EFFECTS ON THE SORPTION OF RADIONUCLIDES BY AQUATIC ORGANISMS,
Du Pont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
R. S. Harvey.
Available from NTIS, Springfield, Va 22161 as DP-MS-73-8; $4/copy, $2.25/microfiche. Report No DP-MS-73-8, (May 1973). 20 p, 7 fig, 4 tab, 6 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Radioactivity, *Thermal pollution, *Thermal radiation, *Temperature, *Aquatic environment, *Environmental effects, Aquatic plants, Aquatic animals, Radioecology, Biota, Streams, Aquatic algae, Shrimp, Larvae, Sorption, Cesium, Strontium, Zinc, *South Carolina.
Identifiers: *Savannah River Plant(So Car).

The warm waters of the reactor effluent streams within the Savannah River Plant are sufficiently cooled to support diverse populations of aquatic organisms prior to their confluence with the river. Indigenous species of plants and animals are being studied in the laboratory to determine their role in the fate of radionuclides discharged to the freshwater environment. The effects of water temperature changes on the growth of algae, midge larvae and freshwater shrimp, and their ability to sorb radioactive materials are reported. (Houser-ORNL)
W74-12048

RADIOACTIVITY AND HUMAN DIET.
Pergamon Press, Oxford, Great Britain, 1966. R. S. Russell, editor. 552 p, $15.00.

Descriptors: *Radioactivity, *Diets, *Foods, *Toxicity, *Food chains, Biology, Biological degradation, Biological treatment, Strontium, Cesium, Iodine, Air pollution, Fallout, Water pollution, Soil contamination, Path of pollutants, Transfer.

When radioactive materials are deposited from the atmosphere so that both the land and water are contaminated, agricultural crops or animal produce are the principal sources of radioactivity in human diet; by comparison the contribution of fish and other foods produced in water is small. Thus the major emphasis in this book is given to the mechanisms by which radioactive materials enter man's diet after they have been deposited on growing plants or have entered the soil. These subjects are introduced in Part II, which describes the relevant aspects of soil chemistry and of the physiology of plants and animals. Subsequently, in Parts III and IV the behavior of individual nuclides in each step of the food chain is considered. The relative contributions of different foods to the total dietary intake under different circumstances are discussed, and when possible quantitative relationships are suggested. The greatest attention is given to strontium-90, both because of the complexity of the factors which control its entry into diet and magnitude of the radiation doses which it may deliver. In Part V the general nature of food chains in fresh water and the sea are described. This information is relevant to assessing the effects of liquid radioactive effluent which is discharged from nuclear establishments, but the types of situation which may then arise cannot be predicted in the detailed manner which is often possible when fission products are deposited on the surface of land. The local circumstances at the point where effluent is discharged may vary so widely that an independent evaluation may be necessary in each case. (See W74-12050-12051) (Houser-ORNL)
W74-12049

FOOD CHAINS IN FRESH WATER,
Battelle-Pacific Northwest Lab., Richland, Wash. Biology Dept.
H. A. Kornberg, and J. J. Davis.
In: Radioactivity and Human Diet, p 385-418, 1966. 4 fig, 8 tab, 87 ref.

Descriptors: *Radioactivity, *Potable water, Aquatic environment, *Path of pollutants, *Adsorption, *Absorption, Transfer, *Ion exchange, *Food chains, *Diets, Toxicity, Human population, Water users, Public health, Surface waters, Aquatic life.

The introduction of radioactive materials into inland waters may create special problems due to the unique characteristics of aquatic environments. Because of rapid and selective adsorption and assimilation of radioactivity, surface waters containing levels of nuclides permissible for drinking purposes may support aquatic organisms containing concentrations of radionuclides that would not be tolerable for human consumption. However, no radiation effect on aquatic organisms resulting from radioactive materials present in natural bodies of fresh water has been demonstrated. It is usually assumed that if the water is safe for drinking and producing food, no significant effects will accrue to biological communities living in it. The primary problems that arise when radionuclides are introduced into populated surface waters are those caused by their transfer among members of aquatic communities and eventually to man. Aquatic environments and the factors that affect them are discussed. The fate of radioactive substances in aquatic communities is outlined, and examples are cited of field surveys done where artificial nuclides have been introduced into natural bodies of water. (See also W74-12049) (Houser-ORNL)
W74-12050

FOOD CHAINS IN THE SEA,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
W. A. Chipman.
In: Radioactivity and Human Diet, p 419-453, 1966. 2 fig, 6 tab, 67 ref.

Descriptors: *Oceans, *Seas, *Sea water, *Radioactivity, *Food chains, *Toxicity, *Public health, *Human population, Water users, Diets, Marine life, Fish, Foods, Sorption, Adsorption, Absorption, Transfer, Ion exchange, Aquatic environment, Environmental effects, Radioactivity effects.

The oceans and seas furnish sites for recreation, and are an important source of food, marine products for agriculture and industry, salts and minerals. The extensive sea fisheries of various nations give significant amounts of protein foods to the diet of man. Naturally occurring radioactive isotopes have always been present in the sea but the exploitation of atomic energy for military and peaceful uses has led to appreciable increases in its radioactivity. It has therefore become necessary to consider the effects of man-made radioactive substances both on marine organisms and on marine foods which man consumes. A description is presented of the oceans as an environment for marine life, the addition of radioactive materials to the sea from the use of atomic energy, uptake of radionuclides by organisms in the marine environment, and possible exposure of the population from radioactive contamination of fish and seafoods. (See also W74-12049) (Houser-ORNL)
W74-12051

INDICATORS OF ORGANIC CONTAMINATION IN PLANTATION CANAL, BROWARD COUNTY, FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-12070

ECOLOGY OF THE EULITTORAL ZONE OF LAKES,
Warsaw Univ. (Poland). Zoological Inst.
E. Pieczynska.
Ekol Pol. Vol 20, No 44, p 637-732, Illus, 1972.
Identifiers: Allochthonous matter, Autochthonous production, Ecology, Environmental effects, Erosion, Lakes, *Littoral, *Poland(Masurian lakes), *Eulittoral zone.

Environmental conditions and biological processes in the eulittoral--intermediate zone between the lake and the surrounding land were analyzed. Investigations were carried out on 16 lakes (eutrophic, mesotrophic and dystrophic) of the Masurian Lakeland in northern Poland. The range of eulittoral, depending on the water level fluctuation and configuration of the shore terrace, is to a considerable extent modified by the erosion and accumulation processes. Allochthonous matter (of lake and terrestrial origin) and autochthonous production are the sources of organic matter in the eulittoral. The decomposition rate of this kind of matter was analyzed. The role of the eulittoral in the functioning of the lake system was discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-12151

EFFECT OF GRANULATED DDT USED IN MOSQUITO CONTROL ON WATER ORGANISMS, (IN RUSSIAN),
Institute of Medical Parasitology and Tropical Medicine, Moscow (USSR).
M. G. Trofimova, and A. M. Mitrofanov.
Med Parazitol Parazit Bolezn. Vol 41, No 5, p 620-622, Illus, 1972. English summary.
Identifiers: Aedes-spp, *Chironomidae, Cladocera, Copepods, *DDT, Ecology, Environmental effects, *Mosquito control, Organisms, Water pollution effects, *Toxicity.

DDT (10% granulated) was used for control of larvae of mosquitoes of the genus Aedes. After aerial treatment of water reservoirs 100% death of larvae occurred in 24 h. Specimens for determination of DDT content in the water (surface and bottom layers), vegetation and soil were taken before and after treatment several times during 1 mo. According to chemical analyses, DDT was not found either in the superficial layer of water or in the water vegetation. The content of DDT in the bottom layer and silt varied from 0.001-0.007 mg/l and from 0.5-1.1 ml/kg, respectively. Observations of the population densities of hydrobionts in treated water reservoirs showed the organisms distributed in the thickness of water (Copepods and Cladocera) to be beyond the zone of toxic effect of granulated DDT, whereas the bottom Chironomidae died after introduction of the drug into the water reservoir.--Copyright 1974, Biological Abstracts, Inc.
W74-12154

SEASONAL AND ANNUAL PHYTOPLANKTON CHANGES IN CHIVYRKUISKII BAY, LAKE BAIKAL, (IN RUSSIAN),
Limnologicheskii Institut, Irkutsk (USSR).
G. I. Popovskaya.
Gidrobiol Zh. Vol 9, No 5, p 5-11, 1973. English summary.
Identifiers: *Algae, Annual, Biomass, *Diatoms, Lakes, *Phytoplankton, *Seasonal, *USSR(Lake Baikal), *Cyanophyta.

Data are presented on the species composition, seasonal and interannual dynamics of phytoplankton; 125 forms of algae were found. Their annual distribution is characterized by 3 maxima, spring and autumn being formed by diatoms, the summer one (the highest) by blue-green algae. The biomass oscillations from year to year are much smaller in the bay than in the Baikal (USSR) pelagic zone.--Copyright 1974, Biological Abstracts, Inc.
W74-12160

DETRIMENTAL EFFECTS OF TOXICAL CHARGE BY HEAVY METALS OR PHENOL ON SUBMERGED MACROPHYTES (FONTINALIS ANTIPYRETICA L.), (IN GERMAN),
Technische Universitaet, Dresden (East Germany). Bereich Hydrobiologie.
S. Auerbach, P. Pruefer, and G. Weise.
Int Rev Gesamten Hydrobiol. Vol 58, No 1, p 19-32, Illus, 1973. English summary.
Identifiers: Cadmium, *Carbon dioxide exchange, Copper, *Fontinalis-antipyretica, *Heavy metals, *Macrophytes(Submerged), Mercury, *Phenols, Productivity, *Toxicity, Water pollution effects, Infrared analysis, Water moss.

The water moss F. antipyretica L. is well suited for measuring CO_2 exchange by IR gas analysis (IRGA), as only CO_2 is used for assimilation. Both in a state of full activity and of reduced activity in the course of a toxic charge the ratio of net primary productivity to respiration related to intermittent illumination is used as a bioassay. Three types regarding the proportion of net assimilation (AN) to respiration (RD) are referred to the toxic charge (phenol, $HgCl_2$, $CuSO_4$, $CdCl_2$). In the case of displacing the balance of AN/RD in the diurnal cycle to the side of respiration, photosynthetic oxygenation in the water ecosystem decreases. The combination of measuring CO_2 exchange by IRGA with a cyto-physiological investigation by determining the time of deplasmolysis of leaves is used for the prediction of vitality long before damage including lethal effects are recognized morphologically.--Copyright 1974, Biological Abstracts, Inc.
W74-12165

MICROBIOLOGICAL OXIDATION OF HYDROGEN SULFIDE IN THE REPNOE LAKE (SLAVONIC LAKES), (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.

V. M. Gorlenko, E. N. Chebotarev, and V. I. Kachalkin.
Mikrobiologiya. Vol 42, No 4, p 723-728, Illus, 1973. English summary.
Identifiers: Chlorobium-phaeovibrioides, Growth rate, *Hydrogen sulfide, Lakes, *Light intensity, Microbiological studies, *Oxidation, Photosynthesis, *Sulfur bacteria, *USSR(Repnoe Lake), Phototrophic.

Oxidation of H2S in the water of the Repnoe lake, USSR, was mainly due to the activity of phototrophic sulfur bacteria. Chlorobium phaeovibrioides dominated (33.1,000,000 cells/ml). The maximal rate of the bacterial photosynthesis (160 microgram/C/l/day) was registered at a depth of 5.5 m at the boundary of the H2S zone. Low light intensity was the main factor limiting growth of the phototrophic sulfur bacteria.--Copyright 1974, Biological Abstracts, Inc.
W74-12168

INFORMAL OPINIONS,
Food and Drug Administration, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-12173

BIOLOGICAL METHODS FOR THE ASSESSMENT OF WATER QUALITY (SYMPOSIUM PRESENTED AT THE 75TH ANNUAL MEETING, AMERICAN SOCIETY FOR TESTING AND MATERIALS, LOS ANGELES, CALIF., 26-29 JUNE 1972).
American Society for Testing and Materials, Philadelphia, Pa.
For primary bibliographic entry see Field 5A.
W74-12174

THE ABC'S OF POLLUTANT BIOASSAY USING FISH,
Guelph Univ., (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W74-12176

USE OF ALGAE, ESPECIALLY DIATOMS, IN THE ASSESSMENT OF WATER QUALITY,
Academy of Natural Sciences, Philadelphia, Pa. Dept. of Limnology.
For primary bibliographic entry see Field 5A.
W74-12180

USE OF AQUATIC INVERTEBRATES IN THE ASSESSMENT OF WATER QUALITY,
Utah Univ., Salt Lake City. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W74-12181

A TENTATIVE PROPOSAL FOR A RAPID IN-PLANT BIOLOGICAL MONITORING SYSTEM,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5A.
W74-12183

RAPID BIOLOGICAL MONITORING SYSTEM FOR DETERMINING AQUATIC COMMUNITY STRUCTURE IN RECEIVING SYSTEMS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5A.
W74-12184

ASSESSMENT OF FISH FLESH TAINTING SUBSTANCES,
Environmental Protection Agency, Grosse Ile, Mich. Grosse Ile Lab.
For primary bibliographic entry see Field 5A.
W74-12186

USE OF HISTOLOGIC AND HISTOCHEMICAL ASSESSMENTS IN THE PROGNOSIS OF THE EFFECTS OF AQUATIC POLLUTANTS,
Louisville Univ., Kentucky. School of Medicine.
For primary bibliographic entry see Field 5A.
W74-12187

MOBILE BIOASSAY LABORATORIES,
Industrial Bio-Test Labs., Inc., Northbrook, Ill.
For primary bibliographic entry see Field 5A.
W74-12191

THERMAL EFFECTS OF A NUCLEAR POWER PLANT ON THE MISSISSIPPI RIVER AT MONTICELLO, MINNESOTA,
Saint Cloud State Coll., Minn. Dept. of Biology.
A. J. Hopwood.
Available form the National Technical Information Service, Springfield, Va 22161 as PB-235 833, $4.75 in paper copy, $2.25 in microfiche. Minnesota Water Resources Research Center, St. Paul, July 1974. Bulletin 19. 134 p, 53 fig, 30 tab, 23 ref. OWRT B-032-MINN(3). 14-31-0001-3097.

Descriptors: *Thermal pollution, *Lotic environment, *Fish populations, Benthos, *Minnesota, *Mississippi River, *Nuclear powerplant, Mayflies, Diptera, Invertebrates, *Aquatic insects, Water pollution effects.
Identifiers: Monticello(Minn), Trichoptera.

The thermal effects of the nuclear power plant at Monticello, Minnesota were assessed by comparing postoperational (1971-1972) data to baseline data (1968-1971) on the Mississippi River. Macroinvertebrate samples from artificial substrates placed upstream were compared to those from the heated zone downstream. Trichopteran biomass increased, ephemeropterans and dipterans decreased in the heated zone. Significant responses to heated water were observed for Trichoptera in the July-October period, Ephemeroptera were most affected in the May-August period, Dipterans declined significantly during September through November. The number of species was not affected by the heat. Growth rates of macroinvertebrate groups in upstream and downstream areas were not significantly different in four of seven 35-day cycles observed. A comparison of the number of fish caught by electrofishing along the oposite sides of the river showed that black crappies, smallmouth bass, and walleyes were more numerous on the heated side, and were often attracted to the discharge canal from adjacent areas of the river. Rough fish were generally indifferent to the heated water in most areas, but carp were more attracted by the discharge canal than other species. Normal movements of minnows and other population characteristics seemed unaffected by the temperature rise. Effects of the power plant upon other organisms, such as birds have been minor. (Walton-Minnesota)
W74-12200

STUDIES ON THE EFFECTS OF SEWAGE EFFLUENT ON SELECTED GROUPS OF ARTHROPODS AND PHYTOPATHIC NEMATODES.
Michigan State Univ., East Lansing. Dept. of Entomology.
Available from National Technical Information Service, Springfield, Va 22161 as PB-235 823, $3.00 in paper copy; $2.25 in microfiche. Completion Report (September 1974). 14 p, 5 tab, 5 ref. OWRT A-074-MICH(1), 14-31-0001-4022.

Descriptors: *Nematodes, *Sewage effluents, Cores, Water pollution effects, *Michigan, Mosquitoes, Irrigation, Water quality, *Insects.
Identifiers: *Water quality management projects, Sewage effluent irrigation, Biting flies, Small mammals, *Arthropods, Seriological surveys, Haematrophagous insects, Phytopathic nematodes.

Results are presented of a one year study conducted at the Michigan State University Water Quality Management Project in East Lansing, Michigan. The primary objective of the study was to obtain pre-operational baseline data that could be used as points of reference in planned studies to determine the long term effects of this sewage irrigation project on the maematophagous insects, soil microarthropods and phytopathic nematodes in the project site. This included specific efforts to identify the haematrophagous insects that were indigenous to the project area, to assess their potential as human or animal pests and/or disease vectors, and to identify and categorize the soil microarthropods and phytopathic nematodes that now are present in the proposed irrigation plots and the areas adjacent to the water impoundments constructed for the project.
W74-12202

EFFECTS OF CADMIUM SALTS ON THE REPRODUCTIVE POTENTIAL OF MALE RAINBOW TROUT AS DETERMINED BY IN-VIVO AND INVITRO TECHNIQUES,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W74-12204

CULTURING AND ECOLOGY OF DIAPTOMUS CLAVIPES AND CYCLOPS VERNALIS,
Univ. of Oklahoma, Norman. Dept. of Zoology.
A. Robertson, C. W. Gehrs, B. D. Hardin, and G. W. Hunt.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-006, $2.55; microfiche from NTIS, Springfield, Va 22161 as PB-234 613, $2.25. Environmental Protection Agency Ecological Research Series Report, EPA-660/3-74-006, April 1974. 226 p, 18 fig, 5 tab, 70 ref, 8 append. EPA Program Element 1BA021, 18050 ELT.

Descriptors: *Copepods, *Water temperature, Aquatic populations, *Bioassay, Crustaceans, Animal ecology, Zooplankton, Food abundance, Laboratory animals, Environmental effects, Reproduction, *Temperature resistance, Thermal pollution, Water pollution effects.
Identifiers: *Diaptomus clavipes, *Cyclops vernalis, Laboratory culturing, Temperature relations, Food relations, Population dynamics, Life tables.

Results are presented of studies undertaken to develop a method maintaining healthy self-propagating, laboratory cultures of the freshwater calanoid copepod, Diatomus clavipes. Recommendations are given as to container size, type of culture medium, light conditions, temperature conditions, food type and quantity, frequency of replacement medium, and amount of disturbance suggested for culturing. The results of a study dealing with effects of temperature on certain reproductive attributes of this species are presented. Temperature is shown to affect the longevity of the adult females as well as the size, carrying time, and probably total lifetime production of clutches. The results indicate that certain of the reproductive attributes of the females are affected by the temperature of early life as well as the acclimation temperature. Results are included of a study on the dynamics of a field population of D. clavipes. The durations of the various life history stages were estimated both from laboratory and field data. Life tables were constructed for the spring generation of this population as well as all generations in a reproductive year combined. The states of greatest relative mortality were identified. Recommendations are presented for culturing the cyclopoid copepod, Cyclops vernalis, and the results of studies concerning effects of temperature on certain reproductive attributes of this species are included. (EPA)

W74-12213

FIRST ANNUAL REPORTS OF THE EPA IFYGL PROJECTS.
National Environmental Research Center, Grosse Ile, Mich. Grosse Ile Lab.
Avaliable from the National Technical Information Service, Springfield, Va 22161 as PB-235 947 $20.75 in paper copy; $2.25 in microfiche. EPA Ecological Research Series No. 3, Report EPA-660/3-73-021, December 1973, 336 p. EPA Program Element 1B1026.

Descriptors: *Phytoplankton, *Nutrients, *Lake Ontario, *Zooplankton, Phosphorus, Mathematical models, Environment, Great Lakes, Data collections, Cladophora, *Eutrophication, Remote Sensing, Algae.
Identifiers: Genesee River(N.Y.), Near shore environment, *Hazardous materials.

The field data collection phase of an intensive multidisciplinary study of Lake Ontario was conducted in 1972-73 by agencies of the United States and Canada. The scientific program was designed to further the basic scientific knowledge of the Great Lakes, to provide the basis for improved water quality and quantity management, and to comprehend the broad impact of the lake on the environment of the Great Lakes Basin. The Chemistry-Biology Program had three major objectives--material balance studies, evaluation of the current ecologic status of the lake, and the development of predictive mathematical models. The chemistry program was conducted at the Rochester Field Office of Region II. The biologically related studies were mainly performed through ten grants administered by the Grosse Ile Laboratory. This document brings together the annual reports prepared by the Grantees. It is hoped that distribution of these annual reports will provide for a more complete analysis of the data collected during International Field Year for the Great Lakes (IFYGL). (Thomas-EPA)
W74-12214

DEVELOPMENT OF FIELD-APPLIED DDT,
Envirogenics Systems Co., El Monte, Calif.
For primary bibliographic entry see Field 5G.
W74-12218

STATE-OF-THE-ART: SAND AND GRAVEL INDUSTRY,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5B.
W74-12224

PHYTOPLANKTON NUTRITION AND PHOTOSYNTHESIS IN LAKE MINNETONKA AND LAKES AT FAIRMONT, MINNESOTA,
Minnesota Univ., Minneapolis. Dept. of Ecology and Behavioral Biology.
R. O. Megard.
Available from the National Technical Information Service, as PB-235 906, $3.75 in paper copy, $2.25 in microfiche. Minnesota Water Resources Research Center, Univ. of Minn., St. Paul, Mimeographed Rept. 64 p, 29 fig, 16 tab, 27 ref. OWRT A-026-MINN(3).

Descriptors: *Phytoplankton, *Photosynthesis, *Lakes, *Minnesota, Dissolved solids, Chlorophyll, Phosphorus, Water pollution effects, Water quality control.
Identifiers: *Lake Minnetonka(Minn), Lake pollution, Lake rehabilitation, Organic carbon.

Abundance of phytoplankton, rates of photosynthesis, concentrations of dissolved substances and other limnological features of Lake Minnetonka, near Minneapolis, and of five lakes near Fairmont, Minnesota, were studied. Lake Minnetonka is a large lake with many basins located in suburban Minneapolis, whereas the lakes at Fairmont are in an agricultural watershed near the Minnesota-Iowa border. Fluctuations of population densities of phytoplankton in 4 basins of Lake Minnetonka were inferred from changes of concentrations of chlorophyll a and particulate organic carbon (POC) during the ice-free season. Concentrations of chlorophyll a during 1972 and 1973 were similar to those during 1968 and 1969 except in the lake's largest basin, where concentrations during 1972 and 1973 were only about 50% as high as during 1968 and 1969. The decrease of chlorophyll is attributable to the reduced influx of phosphorus, which decreased from about 13 metric tons/year because sewage effluents were diverted away from the basin during the winter of 1971-72. The decrease of chlorophyll coincided with lower concentrations of total phosphorus. Population densities of phytoplankton in the 5 lakes at Fairmont, in southern Minnesota are higher than in Lake Minnetonka. Concentrations of dissolved phosphorus must be reduced substantially before it begins to regulate algal abundance in the Fairmont Lakes. (Walton-Minnesota)
W74-12227

DISTRIBUTION OF CYCLOPOIDA COPEPODITES IN THE RESTING STAGE IN BOTTOM SEDIMENTS OF ASTATIC RESERVOIRS,
Polish Academy of Sciences, Warsaw. Inst. of Experimental Biology.
For primary bibliographic entry see Field 2H.
W74-12236

LEVELS OF COBALT, CESIUM AND ZINC IN SOME MARINE ORGANISMS IN JAPAN,
National Inst. of Radiological Sciences, Chiba (Japan). Div. of Environmental Health.
R. Ichikawa, and S. Ohno.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 40, No 5, p 501-508, May 1974. 2 tab, 13 ref.

Descriptors: *Bioassay, *Absorption, *Zinc, *Cobalt, *Cesium, *Marine fish, Metals, Path of pollutants, Food chains, Heavy metals, Industrial wastes, Neutron activation analysis, Analytical techniques, Methodology, Smelts, Shrimp, Mollusks, Water pollution effects.
Identifiers: Flounder, Dolphin, *Japan.

Skine, muscle, viscera and bone of various species of marine fishes were analyzed by the neutron activation method to determine cobalt, cesium and zinc concentrations. Muscle contains much less cobalt and zinc than do the other tissues, whereas cesium is distributed rather uniformly in all of these tissues. The soft part of the short-necked clam showed much higher concentrations of the three elements than did fish muscle. Cobalt and zinc levels in shrimp (soft part and carapace), sea urchin (ovary) and see cucumber (whole body) are high than those in fish muscle, but the cesium level in these animals is somewhat lower than in any fish tissues. The concentration factors of cobalt, cesium and zinc were calculated for various tissues of animals by using the average concentration of the elements in sea water. Values of concentration factors for the animals analysed are in the range of 10 for cesium, 102 for cobalt and 103 for zinc, with some exceptions. (Katz)
W74-12244

ACUTE TOXICITY AND ACCUMULATION OF PCB (KC 300) IN FRESHWATER FISH, (IN JAPANESE),
Freshwater Fisheries Research Lab., Tokyo (Japan).
S. Kimura, H. Kumada, and Y. Matida.
Bulletin of Freshwater Fisheries Research Laboratory, Vol 23, No 2, p 115-123, December 1973. 5 tab, 12 ref. English synopsis.

Descriptors: *Polychlorinated biphenyls, *Absorption, *Carp, *Rainbow trout, Chlorinated hydrocarbon pesticides, Pesticides, *Toxicity, Bioassay Lethal limit, Food chains, Algae, Freshwater, Aquatic animals, Path of pollutants, Water pollution effects.
Identifiers: *TLm, Accumulation, Guppy, Goldfish, Carassius ssp., Cyprinus carplo.

Acute toxicity of PCB to freshwater fish was evaluated, and preliminary experiments were conducted to estimate the accumulation of this compound by freshwater organisms. The PCB tested was KC 300 (trichlorinated form). The 96 hr TLm value of KC 300 for carp fry, guppy fry and adult female guppy were 1.45, 0.9 and 3.2 ppm, respectively. Goldfish and dace accumulated KC 300 directly from water and their concentration factors ranged from 2,000 to 3,000. The residue concentration in surviving female guppies exposed to the 96 hr TLm for 96 hours was 4,000 ppm (wet basis), and the concentration factor was above 1,000. Rainbow trout fingerlings were fed a mixture of fish food and feed oil containing KC 300 for 6 weeks and accumulated approximately 35% of the compound administered. The accumulation of KC 300 through a food chain was unclear and further studies are needed to confirm which pathway, whether through the food chain or directly from environmental water, contributes to the magnification of PCB by fish in natural water bodies. (Katz)
W74-12245

MINERAL FERTILIZATION OF CARP PONDS IN POLYCULTURAL REARING,
Institut fuer Suswasserfischzucht, Plovdiv (Bulgaria).
M. Dimitrov.
Aquaculture, Vol 3, No 3, p 273-285, 1974. 3 tab, 2 fig, 18 ref.

Descriptors: *Aquiculture, *Fertilization, *Biomass, *Productivity, Carp, Fish farming, Fisheries, Productivity, Nitrogen compounds, Phosphorous compounds, Zooplankton, Benthos, Dissolved oxygen, Nutrient requirements, Environmental effects, Animal growth, Diptera, Oligochaetes, Copepods, Primary productivity, Food chains.
Identifiers: Superphosphate, Cladocera, Rotatoria.

Polycultural carp growing using intenstive mineral fertilization (weekly and every 3 days) was examined. The greatest zooplankton and benthos biomass and the greatest fish growth per ha water area were obtained with 3-day mineral fertilization with ammonium nitrate, 708 kg/ha, and superphosphate, 395 kg/ha. The highest average season zooplankton biomass in mixed fertilization (mineral and organic) is 2.437 g/m3. The highest average seasonal biomass of the benthos is established with three-day mineral fertilization, 1.472 g/m2. The total fish growth with three-day fertilization is 300 kg/ha higher than in the control ponds, without fertilization. The best fishery results have been achieved with three-day fertilization giving a total growth of the fish of 2,730 kg/ha and a food coefficient of 2.8. (Katz)
W74-12246

DEAD POPULATIONS OF FISH IN THE RIVERS JORDAN AND ZARQA,
Jordan Univ., Amman. Basic Medical Sciences.
M. J. Haddadin, and A. A. Alawi.
Biological Conservation, Vol 6, No 3, p 215-216, 1974. 1 fig.

Descriptors: *Analytical techniques, *Fishkill, *Pesticides, *Insecticides, Spectrophotometry, Toxicants, Carp, Organophosphorous, Poisons, Animal pathology, Water pollution effects, Pollutant identification.
Identifiers: *Parathion, Gills, *Amman(River Jordan), *Amman(River Zarqa).

Large numbers of dead fish in the Rivers Jordan and Zarqa in March 1973 suggested poisoning by insecticide. Spectrophotometry of extracts from fish gills and liver indicated that the probable was Parathion in a fine suspension. (Katz)
W74-12247

LONG-TERM CHANGES IN THE SETTLEMENT OF BARNACLES IN THE MIAMI AREA,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
H. B. Moore, H. D. Albertson, and S. M. Miller.
Bulletin of Marine Science, Vol 24, No 1, ; 86-100, 1974. 10 fig, 10 ref.

Descriptors: *Crustaceans, On-site investigations, *Florida, Environmental effects, *Temperature, *Sewage, Pollution, Water pollution effects, Hurricanes, Population, Invasion, Methodology, Discharge(Water), Seasonal, Oysters, Algae, Benthic fauna, Benthos.
Identifiers: *Barnacles, *Settlement rates, Balanus ssp., *Miami Beach(Florida), Cypris.

Daily and monthly counts of barnacle settlement rates on test panels at Miami Beach are presented for the years 1943 to 1970. The effects of various environmental factors, such as water temperature, river discharge, sewage pollution, and hurricanes upon the barnacle populations of the test panel are also discussed. Changes in the species composition due to the immigration of two species of barnacles new to the Miami area are also documented. In addition, barnacle settlement is considered in relation to populations of other fouling organisms found on the panels. (Katz)
W74-12248

THE EFFECTS OF ENVIRONMENTAL STRESS ON OUTBREAKS OF INFECTIOUS DISEASE OF FISHES,
Eastern Fish Disease Lab. Bureau of Sport Fisheries and Wildlife, Kearneysville, W. Va.
S. F. Snieszko.
Journal of Fish Biology, Vol 6, No 2, p 197-208, 1974. 1 fig, 4 tab, 50 ref.

Descriptors: *Fish diseases, *Water pollution effects, *Stress, *Reviews, Diseases, Animal pathology, Environmental effects, Toxicants, Water chemistry, Aquatic environment, Infection, Temperature, Thermal stress, Thermal pollution, Oxygen, Dissolved oxygen, Supersaturation, Nitrogen, Eutrophication, Sewage, Biological Oxygen Demand, Metabolism, Industrial pollution, 2,4-D, Pesticides, Publications.
Identifiers: Metabolic wastes.

Infectious diseases of fishes occur when susceptible fishes are exposed to virulent pathogens under certain environmental stress conditions. Very little research has been carried out to show the effect of pollution on outbreaks of infectious diseases of fishes. Examples taken from the literature were selected and reviewed to show the coincidence of infectious diseases with stress caused by temperature, eutrophication, sewage, metabolic products of fishes, industrial pollution and pesticides. (Katz)
W74-12249

SOME PARTICULATE AND SOLUBLE AGENTS AFFECTING THE RELATIONSHIP BETWEEN METAL TOXICITY AND ORGANISM SURVIVAL IN THE CALANOID COPEPOD EUCHAETA JAPONICA,
British Columbia Univ., Vancouver. Inst. of Oceanography.
A. G. Lewis, P. H. Whitfield, and A. Ramnarine.
Marine Biology, Vol 17, No 3, p 215-221, 1972. 1 fig, 3 tab. 20 ref.

Descriptors: *Copepods, *Toxicity, *Chelation, *Resistance, Clay minerals, Sediments, Plankton, Metals, Diatoms, Sewage effluents, Trace metals, Methodology, Soils, Phytoplankton, Adsorption.
Identifiers: *Euchaeta japonica, Ascorbic acid, Humic acids, Particulates, Metal-binding capability.

Particulate and water-soluble agents were tested to determine their ability to affect the relationship between metal toxicity and the survival of Euchaeta japonica (Copepoda, Calanoida). Clay minerals and diatoms were two types of particles capable of affecting this relationship. Ascorbic acid, sewage effluent, and water extracts of humic acid and two types of soils exhibited the same capability. The ability of the water-soluble agents was compared to that of a known chelating agent in an attempt to quantify the activity of the agents. (Katz)
W74-12250

EFFECTS OF AERATION IN EARTHEN PONDS ON WATER QUALITY AND PRODUCTION OF WHITE CATFISH,
South Carolina Agricultural Experiment Station, Clemson.
H. A. Loyacano.
Aquaculture, Vol 3, No 3, p 261-271, 1974. 2 fig, 3 tab, 5 ref.

Descriptors: *Water quality, *Catfishes, *Aeration, Chemical oxygen demand, Water properties, Oxygen demand, Fish farming, Fish management, Methodology, Aquiculture, Dissolved oxygen, Growth rates, Productivity, Water chemistry.

Comparing effects of air volumes of zero, 6.9 and 10.4 m3/min per ha (0, 100 and 150 ft3/min per acre) indicated that greater volumes of air resulted in increased fish production. Increased volumes of air resulted in proportionate increases in dissolved oxygen content, allowing greater weights of foods to be offered to fish without depleting the oxygen content of the pond water. Chemical oxygen demand was inversely related to the volume of air delivered. (Katz)
W74-12251

COASTAL MARINE POLLUTION AND FISH,
Fisheries Research Board of Canada, West Vancouver, B.C. Pacific Environmental Inst.
M. Waldichuk.
Ocean Management, Vol 2, No 1, p 1-60, 1974. 7 tab, 110 ref.

Descriptors: *Marine fisheries, *Water pollution control, *Coasts, *Reviews, Fisheries, Water pollution sources, Water pollution effects, Industrial wastes, Domestic wastes, Sewage, Estuaries, Metals, Pesticides, Pollutants, Thermal pollution, Aquiculture, Water quality, Dissolved oxygen, Hydrogen ion concentration, Environmental effects, Ecosystems, Pulp wastes, Suspended solids, Food chains, Primary productivity, Toxicity, Shellfish, Biochemical oxygen demand, Oil, Radioactive wastes.
Identifiers: *Sub-lethal effects, Bioaccumulation, Artificial habitats.

Aquatic organisms are being threatened by a multitude of different types of pollutants, which impose a sub-lethal stress on the coastal marine ecosystem at all tropic levels. Reduction in diversity of species and population changes threaten the ecosystems. The economic effect of this pollution on world fisheries is considered and the importance of evaluating man's wastes and the possibilities of recycling these through the aquatic environment for man's benefit are discussed. Topics include: the use of domestic sewage for enriching the coastal waters for increased fish production; the use of cooling waters from thermal plants for enhancing growth of warm water species; using solid refuse to build artificial reefs for reef fish; and using artificial mudflats for intertidal shellfish culture. (Katz)
W74-12252

AMMONIA EXCRETION BY ZOOPLANKTON AND ITS SIGNIFICANCE TO PRIMARY PRODUCTIVITY DURING SUMMER,
Univ. of Washington, Seattle. Dept. of Oceanography.
M. Jawed.
Marine Biology, Vol 23, p 115-120, 1973. 2 fig, 2 tab, 23 ref.

Descriptors: *Ammonia, *Nitrification, *Primary productivity, *Cycling nutrients, Nitrogen compounds, Nitrogen, Zooplankton, Nitrogen cycle, Ammonification, Marine Plants, Marine animals, Nutrients, Withdrawl, *Columbia River, Methodology, Spectrophotometry, Jelly fish, Copepods, Nitrates, Stratification, Summer, Washington, Oregon.
Identifiers: *Excretion, Ammonia-N, Excretory rates.

Excretion rates of ammonia have been determined for zooplankton off the coasts of Washington and Oregon. Rates varied from 0.16 to 0.60 microgram-at NH4+ -N/ mg dry weight/day for most planktonic animals, and from 0.02 to 0.06 for jelly fishes. Ammonia concentration in sea water was low in offshore regions. Ammonia released by zooplankton was studied in relation to primary productivity during summer. In the Columbia River plume offshore, excreted ammonia contributed about 90% of the total nitrogen requirements of observed production rates. The ammonia-N contribution was 36% in oceanic waters, and was relatively unimportant in the inshore region. The significance of eddy diffusivity in offshore waters and upwelling in inshore waters is also discussed. (Katz)
W74-12253

OXYGEN CONSUMPTION IN RELATION WITH SIZE AND TEMPERATURE IN CRUSTACEA (CONSUMO DE OXIGENO EN FUNCION DEL TOMANO Y LA TEMPERATURA EN CRUSTACEOS),
Instituto de Investigaciones Pesqueras, Vigo (Spain).
M. Alcaraz.
Investigacion Pesquera, Vol 38, No 2, p 289-304, April 1974. 6 fig, 4 tab.

Descriptors: *Temperature, *Oxygen, *Size, Crustaceans, Shellfish, Respiration, Oxygen demand, Mathematical models, Mass.
Identifiers: *Prawns, *Decapoda, *Palaemonetes ssp., *Palaemon ssp., *Oxygen consumption, Arrhenius equation.

Oxygen consumption was studied in three species of Crustacea Decapoda (Palaemonetes varians, Palaemon Serratus and Palaemon Elegans); in the last one the relationship between O2 consumption, net weight and temperature was also calculated. Equations were devised which allowed for a mathematical comparison of the apparent effects of weight, body surface and length of oxygen consumption. The same calculations were made at 15, 18 and 20 degrees C to determine the effect of temperature on the values for oxygen consumption. The Arrhenius law was used for calculation and values are reported. (Katz)
W74-12254

VARIATION OF COPPER, IRON, MANGANESE AND ZINC CONTENTS OF OYSTERS (CRASSOSTREA ANGULATA) AT DIFFERENT STAGES OF GONADAL DEVELOPMENT (VARIACIONES DEL CONTENIDO EN COBRE, HIERRO, MANGANESO Y CINC EN RELACION CON LA MADURACION SEXUAL DEL OSTION, CRASSOSTREA ANGULATA, DE LAS COSTAS DE CADIZ),
Instituto de Investigaciones Pesqueras, Cadiz (Spain).
E. Pascual, and R. Establier.
Investigacion Pesquera, Vol 38, No 2, p 387-395, April 1974. 3 tab, 1 fig, 6 ref.

Descriptors: *Oyster, *Zinc, *Iron, *Manganese, *Copper, *Gonads, *Sexual maturity, Heavy metals, Absorption, Metals, Benthic fauna, Mollusks, Shellfish, Reproduction, Immature growth stage, Spawning, Bioassay.
Identifiers: *Crassostrea angulata, *Ovaries, Accumulation, Ovocytes, Gills, *Spain(Cadiz).

Copper, iron, manganese and zinc contents in Crassostrea angulata was studied in both male and female gonads at different stages of development. Copper and zinc were not concentrated in gonads. Manganese was stored in ovaries and increases in concentration as the volume increases in females. The reverse is true with males. Accumulation of manganese occurs inside the ovocytes during the growth stage. After spawning, the total concentration of manganese in oyster meat, mantle and gills is lower in females than in males. This suggests the possibility of manganese transference from different organs to ovaries. (Katz)
W74-12255

STUDIES ON COPPER, IRON, MANGANESE AND ZINC IN OYSTERS (CRASSOSTREA ANGULATA) ON THE GULF OF CADIZ (ESTUDIOS DEL COBRE, HIERRO, MANGANESO Y CINC EN OSTIONES-CRASSOSTREA ANGULATA-DEL GOLFO DE CADIZ),
Instituto de Investigaciones Pesqueras, Cadiz (Spain).
R. Establier, and E. Pascual.
Investigacion Pesquera, Vol 38, No 2, p 371-384, April 1974. 3 tab, 7 fig, 10 ref.

Descriptors: *Oysters, *Zinc, *Iron, *Copper, *Manganese, *Toxicity, Heavy metals, Bioassay, Absorption, Path of pollutants, Laboratory tests, Methodology, Analytical techniques, Seasonal, Mollusks, Shellfish.
Identifiers: *Crassostrea angulata, Kymograph, Accumulation, Shell movement, *Spain(Gulf of Cadiz).

Seasonal changes in copper, iron, manganese and zinc concentrations in oysters from two areas of SW Spain were studied. Relations between metal content and environmental conditions are unclear. A close correlation between copper and zinc is found. Variation in manganese content appears to be dependent on the sex and gonadal stage. Copper accumulation was shown by laboratory assays, but similar assays with manganese were negative. Shell movements were followed with a kymograph to determine the toxicity of different concentrations of metals. The first alterations of shell movements occurred at concentrations of 0.03 and 0.06 ppm copper. Zinc toxicity was 40-50 times lower than that of copper. (Katz)
W74-12256

EFFECTS OF THE POLYCHLORINATED BIPHENYL AROCHLOR 1254 ON THE AMERICAN OYSTER CRASSOSTREA VIRGINICA,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Lab.
J. I. Lowe, P. R. Parrish, J. M. Patrick, Jr., and J. Forester.
Marine Biology, Vol 17, No 3, p 209-214, 1972. 4 fig, 1 tab, 10 ref.

Descriptors: *Polychlorinated biphenyls, *Growth rate, *Oysters, *Arochler, Laboratory tests, Absorption, Bioassay, Pesticides, Chlorinated hydrocarbon pesticides, Mortality, Pathology, Seawater, Animal physiology, Gas chromatography, Analytical techniques, Methodology, Retention, Microscopy, Cytological studies, Water pollution effects.
Identifiers: *Accumulation, *Crassostrea virginica, Depuration, Pathogenesis, Histopathology.

Young oysters were continuously exposed to Arochlor 1254, a PCB, in flowing, unfiltered seawater. Growth rate was significantly reduced in oysters exposed to 5 ppb for 24 weeks. Growth rate was not affected in oysters exposed to 1 ppb for 30 weeks. Mortality was not significant in exposed and control groups. In oysters exposed to 5 ppb, greatest PCB residue (whole body) was 425 mg/kg (ppm), 85,000 times the concentration in the water, and less than 0.3 ppm was retained after 28 weeks depuration in PCB-free water. In oysters exposed to 1 ppb, greatest residue was 101 ppm, 101,000 times the concentration in the water and less than 0.2 ppm was retained after 12 weeks depuration. Examination of oysters exposed to 5 ppb of this PCB for pathogenesis atrophy of digestive diverticular epithelium and degeneration of vesicular connective tissues concomitant with leukocytic infiltration, but tissue recovery seemed excellent after 12 weeks depuration. (Katz)
W74-12259

PRELIMINARY STUDY OF TEMPERATURE TOLERANCE IN JUVENILE HAWAIIAN MULLET (MUGIL CEPHALUS),
Oceanic Inst., Waimanaol, Hawaii.
J. R. Sylvester, C. E. Nash, and C. E. Emberson.
The Progressive Fish Culturist, Vol 36, No 2, p 99-100, April 1974. 1 tab, 10 ref.

Descriptors: *Lethal limit, *Temperature, *Mullets, Marine fish, Freshwater, Sea water, Laboratory tests, Juvenile fish, Resistance, Heat resistance, *Thermal pollution.
Identifiers: *Mugil cephalus, Temperature tolerance, Thermal shock, Zone of tolerance, Acclimation.

The upper and lower thermal limits necessary for the survival of juvenile Hawaiian mullet in freshwater and salt water were determined in laboratory tests. After acclimation at 21 degrees C in freshwater the upper lethal level was between 27 degrees and 29.6 degrees C, the lower level between 10.2 degrees and 15.0 degrees C. In saltwater following acclimation at 26 degrees C, the upper level is between 29.0 and 33.0 degrees C, and the lower level is between 10.4 and 14.0 degrees C. Results suggest that the zone of tolerance, as designated by upper and lower lethal levels, for juvenile mullet is greater in sea water. Other tests show that juvenile mullet are more resistant to the effects of low temperature than to high temperature. (Katz)
W74-12260

THE USE OF BIOASSAYS TO DETERMINE THE RATE OF DEACTIVATION OF PESTICIDES,
Bureau of Sport Fisheries and Wildlife, La Crosse, Wis. Fish Control Lab.
L. L. Marking, and C. R. Walker.
Bioassay Techniques and Environmental Chemistry, p 357-366, 1973. 3 tab, 3 fig, 5 ref.

Descriptors: *Bioassay, *Pesticides, *Toxicants, Resistance, Anamycin A, Laboratory tests, Hydrogen ion, Concentration, Rainbow trout, Sunfishes, Bullheads, Channel catfish, Methodology, Mortality, Lethal limits, Model studies.
Identifiers: *Biological half-life, LC50, Goldfish, Biological activity, Ictalurus punctatus.

The biological half-life of a pesticide can be established by determining the tolerance of fish or other organisms in bioassay of aged solutions containing unknown residual concentrations, and in concurrent reference tests containing known concentrations. The half-life of biological activity is calculated in two procedures by plotting the percent concentration remaining in aged solutions or the deactivation indices against aging time on cyclic semi-logarithmic graph paper. The half-life of biological activity of antimycin, a powerful fish toxicant, was determined for rainbow trout, goldfish, channel catfish, black bullhead, green-sunfish and bluegill. Antimycin was deactivated rapidly in high pH waters and the half-lives were as follows: pH 10=1.5 hours, pH 9.5=4.6 hours, pH 9.0=9.7 hours, pH 8.5=46 hours, pH 8=100 hours, pH 7.5=120 hours, and pH's 6.0 and 6.5=310 hours. (Katz)
W74-12261

UPTAKE, METABOLISM AND DISCHARGE OF POLYCYCLIC AROMATIC HYDROCARBONS BY MARINE FISH,
Scripps Institution of Oceanography, La Jolla, Calif.
R. F. Lee, R. Sauerheber, and G. H. Dobbs.
Marine Biology, Vol 17, No 3, p 201-208, 1972. 9 tab, 28 ref.

Descriptors: *Organic compounds, *Metabolism, *Marine fish, *Aromatic compounds, Sculpins, Path of pollutant, Animal physiology, Biochemistry, Analytical techniques, Urine, Sea water, Absorption, Tracers, Chemical analysis, Lipids, DDT.
Identifiers: *Polycyclic aromatic hydrocarbons, *Naphthalene, 3-4-benzopyrene, Mudsucker, Sand dab, Gillichthys mirabilis, Oligocottus maculosus, Citharichthys stigmaeus, Gall bladder, Liver, Accumulation, Detoxification.

The uptake, metabolism and discharge of two polycyclic aromatic hydrocarbons, 14C-naphthelene and 3H-3,4-benzopyrene, were studied in 3 species of marine fish (mudsucker, Gillichthys mirabilis; sculpin, Oligocottus maculosus; sand dab, Citharichthys stigmaeus). The path of hydrocarbons through the fish included entrance through the gills, metabolism by the liver, transfer of hydrocarbons and their metabolites to the bile, and, finally, excretion. The gall bladder was a major storage site of labeled hydrocarbons and their metabolites. The major product of 3H-3,4-benzopyrene metabolism was tentatively identified as 7,8-dihydro-7,8-dihydroxybenzopyrene. The 14C-napthalene was metabolized to 1,2-dihydro-1,2-dihydroxynaphthalene after 24 h exposure. The urine appeared to be the major avenue for discharge of labeled hydrocarbon from the body. Certain polycyclic aromatic hydrocarbons were rapidly taken up from seawater by the above fish, but detoxification mechanisms existed for efficient removal of these compounds from their body tissue. (Katz)
W74-12262

THE FISH POPULATIONS OF AN INDUSTRIAL RIVER IN SOUTH WALES,
University of Wales Inst. of Science and Tech., Cardiff. Dept. of Applied Biology.
R. Williams, and M. F. Harcup.
Journal of Fish Biology, Vol 6, No 4, p 395-414, July 1974. 1 fig, 10 tab, 34 ref.

Descriptors: *Coal mine wastes, *Brown trout, Water pollution sources, Fish stocking, Industrial wastes, Urban runoff, Suspended solids, *Suspended load, Trout, Spawning, Algae, Methodology, Growth rates, Minnows, Fish populations, Biomass.
Identifiers: *Steelworks wastes, *Recolonization, Roach, Chub, *United Kingdom(Wales-River Sirhowy).

The River Sirhowy, a trout river in south-east Wales still subject to sporadically high levels of suspended solids derived from the coal mining industry, was investigated over a three year period to assess its importance in the recolonization of a fishless river, the Ebbw Fawr, which is expected to recover from the effects of steelworks effluents discharged near its headwaters. Eight species of fish were recorded. Spawning areas for brown trout were limited by industrial and urban developments and the discharge of suspended solids. Small numbers of native trout were produced in the system and the growth of these fish was poor in the main river, confirming the need for regular stocking. Movements of stocked trout were limited except in the lower reaches of the river where the presence of a native population, high

levels of suspended solids and flash floods may have increased the numbers of fish moving into the recovering Ebbw Fawr. (Katz)
W74-12263

CHANGES IN THE FISH SPECIES COMPOSITION OF THE GREAT LAKES,
Ontario Ministry of Natural Resources, Maple. Fish and Wildlife Research Branch.
W. J. Christie.
Journal of the Fisheries Research Board of Canada, Vol 31, No 5, p 827-854, May 1974. 10 fig, 4 tab, 90 ref.

Descriptors: *Great Lakes, *Lake trout, *Oligotrophy, Invasion, *Predation, Lake Erie, Lake Huron, Lake Superior, Lake Ontario, Lake Michigan, Succession, Competition, Ecosystems, Lampreys, Smelts, Herrings, *Eutrophication, Pest control, Environmental effects, Ecology, Dominant organisms.
Identifiers: *Sea lamprey, *Burbot, *Alewifes, Overfishing, Pest species.

The case histories of the changes that occurred in each of the Laurentian Great Lakes, as presented for the 1971 symposium on Salmonid Communities in Oligotrophic Lakes, are reviewed. Lakes Huron, Michigan, and Superior passed through a parallel series of stock changes after the invasion by sea lamprey. Lake trout and burbot stocks collapsed, followed by an increase in rainbow smelt, deepwater cisco and alewife stocks. Lake herring stocks collapsed in apparent response to the smelt increase. Eutrophication and more direct pollution stresses had mainly inshore impacts, but the similarity in the species sequencing in the Oligotrophic Great Lakes suggested that their influence before about 1950 was less than that of overfishing and the invasion of exotic species. Control of sea lamprey, overfishing, and eutrophication seemed attainable in the Great Lakes, but the only defense against further invasions by pest species appeared to be maintenance of sufficiently dense piscivore stocks to assure their suppression. (Katz)
W74-12264

THE COMMON MUSSEL MYTILUS EDULIS AS INDICATOR FOR THE LEAD CONCENTRATION IN THE WESER ESTUARY AND THE GERMAN BIGHT, (DIE MIESMUSCHEL MYTILUS EDULIS ALS INDIKATOR FUR DIE BLEIKONZENTRATION IM WESERASTUAR UND IN DER DEUTSCHEN BUCHT),
Institut fuer Meeresforschung, Bremerhaven (West Germany).
For primary bibliographic entry see Field 5B.
W74-12265

RESIDUAL CHLORINE RETENTION AND POWER PLANT FISH FARMS,
Oceanic Inst., Waimanolo, Hawaii.
C. E. Nash.
The Progressive Fish Culturist, Vol 36, No 2, p 92-95, April 1974. 2 tab, 3 ref.

Descriptors: *Chlorine, *Fish farming, *Powerplants, Pest control, Cooling waters, Safety factors, Industrial wastes, Water pollution, Sources, Pollutants, Water chemistry, Aquaculture, Toxicity.
Identifiers: *Residual free chlorine, *Detection systems, Maximum safe flow rate, Diethyl-p-phenylene diamine.

The problems created in power plant fish farms by chlorine used to control fouling organisms in both saltwater and freshwater circulating systems are discussed theoretically. Chlorine in the power plant discharge could be lethal in aquacultural establishments. (Katz)
W74-12266

NITRATE AND NITRITE TOXICITY TO SALMONID FISHES,
Rhode Island Univ., Kingston. Marine Experiment Station.
D. T. Westin.
The Progressive Fish Culturist, Vol 36, No 2, p 86-89, April 1974. 1 tab, 2 fig, 14 ref.

Descriptors: *Salmonids, *Toxicity, *Nitrates, *Nitrites, Water pollution effects, Ammonia, Water quality, Chinook salmon, Rainbow trout, Methodology, Toxicants, Hatcheries, Water quality control, Water reuse, Recirculated water, Fishkill, Mortality, Salinity, Freshwater, Sea water, Bioassay.
Identifiers: *Orcorhynchus tshawtscha, TLM, Metabolic wastes.

The median tolerance limit (TLM) concentration of nitrates and nitrites were determined for Chinook Salmon and Rainbow Trout. The effect of varying salinity on Rainbow Trout after exposure to nitrate and the effect of exposure time on mortality were examined. The relative activity of nitrite to Chinook fingerlings in freshwater was 2,000, 1,480, and 2,700 times that of nitrate in freshwater, at 96-hour, 7 and 10-day TLM, respectively. All of the trout subjected to nitrate concentrations showed acute signs after 2 days exposure, while these signs were not observed in the lower nitrate concentrations until after 5-8 days. Guidelines for hatchery water quality may be set from the data. Best results of growth and good health would indicate nitrate concentrations of 25-35 ppm and 0.12 ppm nitrite. Mode of action of nitrate as a toxicant must still be determined. (Katz)
W74-12267

SILVER TOXICITY AND ACCUMULATION IN LARGEMOUTH BASS AND BLUEGILL,
Oklahoma Univ. Health Sciences Center, Oklahoma City. Dept. of Environmental Health.
R. L. Coleman, and J. E. Cearley.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 55-61, July 1974. 2 fig, 1 tab, 10 ref.

Descriptors: *Bass, *Sunfishes, Metals, *Toxicity, Absorption, *Heavy metals, *Copper, *Zinc, Respiration, Metabolism, Growth rates, Enzymes, Bioassay, Food chains, Laboratory tests, Water pollution effects.
Identifiers: *Silver, Sublethal effects, Bioconcentration.

Silver has recently been recognized as a potentially toxic substance in aquatic substances. Analytical techniques to detect low levels of silver in the environment were unavailable in the past. Exposure of juvenile largemouth bass and bluegill to silver (0.3 to 70 microgram/liter) resulted in accumulation with highest concentrations in the internal organs of the bass. 70 microgram Ag/l was toxic to the bass within 24 hours but the bluegill tolerated this level for 6 months. Death was apparently due to respiratory disorder with some central nervous system involvement, as indicated by unusual behavior prior to death. The interactions of copper and zinc with silver were also investigated. (Katz)
W74-12270

IMPACT OF RECENT ECONOMIC GROWTH AND INDUSTRIAL DEVELOPMENT ON THE ECOLOGY OF NORTHWEST MIRAMICHI ATLANTIC SALMON (SALMO SALAR),
Fisheries Research Board of Canada, St. Andrews (New Brunswick). Biological Station.
P. F. Elson.
Journal of the Fisheries Research Board of Canada, Vol 31, No 5, p 521-544, May 1974. 14 fig, 5 tab, 49 ref.

Descriptors: *Commercial fishing, *Atlantic salmon, *Fish management, *Water pollution effects, Environmental effects, Mine wastes, Domestic wastes, Pulp wastes, Commercial fish, Sport fish, Sport fishing, Salmon, Methodology, Ecology, Life cycles, Insecticides, Water pollution sources, Forests, Smolt, Estuaries, Distribution, Stocking, Reproduction, DDT, Zinc copper.
Identifiers: *Canada(Miramichi River).

The history of Atlantic salmon (Salmo salar) runs of the Northwest Miramichi from 1950 to 1973 is reviewed. Decreases in these runs are related to degrading ecological conditions in the river's reaches as a result of adverse chemical conditions attributable to recent developments in forest management and to base metal mining. Diversion of indigenous adult stocks into other streams of the system as a result of pollution of the home stream by mining, pulpmill and other human activities is examined and evaluated. Increases of commercial catches as a result of pollution-caused delay in the estuary of migrating adults is analyzed. Depletion of stocks as a result of the combined effects of these factors plus distant-water fishing is identified as is incipient recovery of stocks when home-water commercial fishing was eliminated and pollution abatement measures were introduced to the river. A suppressing effect of heavy angling pressure on stock abundance when stocks are low is noted. (Katz)
W74-12271

ANTICHOLINESTERASE ACTION IN METHYL PARATHION, PARATHION AND AZINPHOS-METHYL IN MICE AND FISH: ONSET AND RECOVERY OF INHIBITION,
Harvard Univ., Boston, Mass. School of Public Health.
G. M. Benke, and S. D. Murphy.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 117-122, July 1974. 2 fig, 1 tab, 16 ref.

Descriptors: *Sunfishes, *Insecticides, *Inhibition, Methodology, Toxicity, Enzymes, Biochemistry, Bioassay, Lethal limit, Laboratory tests, Organophosphorous pesticides, Water pollution effects.
Identifiers: *Azinphosmethyl, Mice, *LC50, *Acetylcholinesterase, *Parathion, Methyl parathion, Recovery.

The lethal ranges of parathion, methyl parathion and azinphosmethyl are 10-200, more than 2500, and 1-10 mg/kg respectively in sunfish. The large differences in these toxicities, relative to mice, (all values between 3 and 15 mg/kg) may be due to the onset and recovery of acetylcholinesterase (AChE) inhibition. This information would be useful in the suggested use of fish brain AChE as a monitor for pollution by organophosphate insecticides. The rates of onset of AChE inhibition did not explain the greater toxicity of parathion and azinphosmethyl relative to methyl parathion in sunfish. The rate of onset and recovery from AChE inhibition by all three pesticides in the fish brain and muscle is much slower than in mice and the slow recovery of AChE in fish may make them more susceptible to cumulative injury by these compounds. (Katz)
W74-12273

THE TOXICITY OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN GUPPIES (POECILIA RETICULATUS PETERS),
Pacific Northwest Forest and Range Experiment Station, Corvallis, Oreg.
L. A. Norris, and R. A. Miller.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 76-80, July, 1974. 1 fig, 2 tab, 18 ref.

Descriptors: *Toxicity, *2-4-5-T, *Herbicides, Chlorinated hydrocarbon, Pesticides, Organic pesticides, Laboratory tests, Pathology, Reforestation, *Water pollution effects, Environmental effects.

Identifiers: *TCDD, *Poecilia reticulatus, *Guppies.

TCDD is a contaminant of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), a herbicide used in reforestation. TCDD is highly toxic to mammals. Its toxicity to aquatic organisms is determined through experimentation with guppies, Poecilia reticulatus. Fish were exposed to 0.1, 1.0 and 10.0 ppb TCDD and all died from a 120 hour exposure, the smallest being first affected. All fish were dead 37 days after exposure. Behavioral and pathological signs of distress occurred in fish that survived more than 10 days. The concentrations of TCDD used in these tests were considerably greater than expected to occur in forest streams after aerial application of 2,4,5-T. The threshold response level for TCDD in fish has not been reported. (Katz)
W74-12274

LEAD CONCENTRATION IN NATIVE TROUT,
Montana State Univ., Bozeman. Dept. of Chemistry.
G. K. Pagenkopf, and D. R. Neuman.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 70-75, July 1974. 1 fig, 3 tab, 17 ref.

Descriptors: *Lead, *Rainbow trout, Analytic techniques, Spectrophotometry, Bioassay, Salmonids, *Path of pollutants, Heavy metals, Absorption, Trout, Brown trout, Cutthroat trout, Environmental effects, *Montana.
Identifiers: *West Gallatin River(Mont).

The concentration of lead in the atmosphere is greatly increased by proximity to highways. The West Gallatin River runs alongside a highway for 40 miles and the lead concentrations found in native trout taken from the river are compared to values for fish taken from fish hatcheries. Water samples were also taken and analyzed. Lead concentrations for gills, bone and tissue were determined, for fish of different ages as estimated by their size and for fish from three location types. Results indicate that there is very little enhancement of the lead concentration in the fish, probably because the traffic load of the highway is not large. (Katz)
W74-12275

THE SUSCEPTIBILITY OF SELECTED INSECTICIDES AND ACETYLCHOLINESTERASE ACTIVITY IN A LABORATORY COLONY OF MIDGE LARVAE, CHIRONOMUS TENTANS (DIPTERA:CHIRONIMIDAE),
Ohio State Univ., Columbus. Dept. of Entomology.
R. E. Karnak, and W. J. Collins.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 62-69, July 1974. 2 tab, 15 ref.

Descriptors: *Diptera, *Midges, *Insecticides, *Toxicity, Food chains, Aquatic insects, Pesticides, Enzymes, Bioassay, Larvae, Methodology, Dieldrin, Carbamate pesticides, Lethal limit, Spectrophotometry, Analysis techniques, DDT.
Identifiers: *Chironomus tentans, *Acetylcholinesterase activity, LC50, Allethrin, Malathion.

Laboratory tests were executed to determine the toxicity of a wide variety of technical grade insecticides to midge larvae. Modes of action and physiological aspects of the organism relating to toxicity, including metabolic detoxication, were determined. The larval stage of Chironomus tentans was very susceptible to representatives of the major groups of organic insecticides, with dieldrin being the most toxic. The susceptibility may be due to the low activity of protective enzymes which allow for detoxication. The organophosphates and carbamates were toxic by virtue of acetylcholinesterase inhibition. (Katz)
W74-12276

CHANGES IN URINE FLOW RATE AND HAEMATOCRIT VALUE OF RAINBOW TROUT SALMO GAIRDNERI (RICHARDSON) EXPOSED TO HYPOXIA,
Ministry of Agriculture, Fisheries and Food, London (England). Salmon and Freshwater Fisheries Lab.
D. J. Swift, and R. Lloyd.
Journal of Fish Biology, Vol 6, No 4, p 379-387, July 1974. 4 fig, 2 tab, 25 ref.

Descriptors: *Rainbow trout, *Oxygen, *Urine, *Animal physiology, Oxygen requirements, Biochemical oxygen demand, Membrane processes, Osmosis, Biochemistry, Metabolism, Methodology, Dissolved oxygen, Water pollution effects.
Identifiers: *Hypoxia, *Metabolic wastes, *Haematocrit, Urine flow rate, Haemoconcentration, Blood volume, Gills, Erythrocytes.

Measurements were made of urine flow rates and haematocrit of rainbow trout exposed to hypoxic conditions (3 mg O2/l) for 3, 4, 5 and 24 hr. Elevated urine flow rates during short time exposure and concomitant increased haematocrit, followed by lower than normal urine flow rates on return to normal aerated water suggest that the haemoconcentration is the initial response to anoxia. Results from longer exposure to hypoxic conditions suggest that the initial period of haemoconcentration is followed by a period of water retention and a return of the blood volume to normal; the sustained elevated haematocrit is thought to be derived from erythrocytes from storage organs. During prolonged exposure rainbow trout also become more permeable to water. (Katz)
W74-12277

ECOLOGICAL ASPECTS OF AQUATIC BIOLOGY THROUGH TIME-LAPSE PHOTOGRAPHY,
Maryland Univ., Solomons. Center for Environmental and Estuarine Studies.
M. J. Reber, and D. G. Cargo.
Maryland Water Resources Research Center, College Park, Completion Report No 25, (1974). 3 p. OWRT A-015-Md(1). 14-31-0001-3020.

Descriptors: *Sea nettles, *Jelly fish, *Photography, Embryonic growth stage, Biocontrol, Aquatic animals.
Identifiers: Cratena pilata, Chrysaora quinquecirrha, *Time-lapse photography, *Nudibranch, Sea slugs.

Records of the asexual budding phase of the sea nettle are now on film, however, techniques developed since that time now present the opportunity to improve upon those first images. In the area of biological control of the jellyfish, a successful attempt has been made to photographically describe the life cycle of a predator sea slug called a nudibranch. Included in this sequence was the ritualistic mating 'dance' and subsequent mutual exchange of gametes. The cleavage and early development of the fertilized egg was also captured on film. This footage has been shown to various malacological and zoological meetings, classes, groups, etc., all over the country. A unique view of molluscan egg development has been recorded.
W74-12345

PREDICTION OF ENVIRONMENTAL QUALITY IN DE-ENRICHED STREAM SYSTEMS,
Michigan Univ., Ann Arbor. School of Natural Resources.
F. F. Hooper, and G. R. Southworth.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 924, $3.75 in paper copy, $2.25 in microfiche. Completion Report, Institute of Water Research, Michigan State University, East Lansing, July 1974. 67 p, 22 fig, 22 ref. OWRR A-070-MICH(1). 14-31-0001-4022.

Descriptors: *Periphyton, *Nutrients, Phosphates, Fertilization, Herbivores, Natural streams, *Michigan, Primary productivity, Organic matter, *Eutrophication, Biological communities, Ecosystems, *Environmental effects.
Identifiers: *Trout stream ecosystem, *Pigeon River(Mich), Channelized stream systems, Surber sampler technique.

The effects of enrichment with 25 ppb inorganic phosphate on the composition and structure of the benthic invertebrate community of a trout stream ecosystem was investigated in a channelized stream system in the Pigeon River, Otsego County, Mich. This study was designed to assess the importance of periphytic production in determining and maintaining benthic community structure, and to gauge the impact of such low level enrichment on the resource value of the ecosystem. It was also designed to compare the changes wrought by plant nutrient enrichment with those associated with enrichment with organic material. The mean number of taxa per sample was higher in the fertilized channels than in the controls, and lower in the covered channel. Faunal diversity was relatively unaffected by fertilization, but was significantly reduced by organic enrichment and the elimination of periphyton. However, the equitability component of diversity was significantly lowered by fertilization and organic enrichment, and increased slightly with the elimination of periphyton. The results demonstrate that the herbivorous component of the invertebrate community is limited in overall abundance by the availability of food resources. Mild fertilization acts to increase this food resource and decrease the intensity of competition for food among herbivores. Nearly 55% of the common taxa in the experimental area were shown to be affected by variation in periphytic production.
W74-12347

EFFECTS OF RESIDUAL TOXINS IN OIL REFINERY EFFLUENTS ON AQUATIC ORGANISMS,
Oklahoma State Univ., Stillwater. Water Resources Research Inst.
T. C. Dorris, S. L. Burks, and G. R. Waller.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 919, $4.00 in paper copy, $2.25 in microfiche. Completion Report, June 30, 1974. 79 p, 17 fig, 20 tab, 3 ref, append. OWRT B-025-OKLA(1). 14-31-0001-3927.

Descriptors: Evaporation, *Toxicity, Discharge(Water), Biological treatment, Lagoons, *Sludge, Bioassay, Minnows, Crustaceans, Cations, Sodium, Calcium, Magnesium, Potassium, Copper, Cadmium, Chromium, Nickel, Lead, Iron, Zinc, Spectrophotometry, Chlorides, Ammonia, Ions, Electrodes, *Oil wastes, Water pollution effects, *Toxins, Chromatography, *Evaporators, *Pollutant identification, Daphnia.
Identifiers: Beckman Total Organic Carbon Analyzer.

Laboratory evaluations of partial evaporation of oil refinery waste waters were performed to determine (1) removal of toxic substances by partial evaporation (2) suitability for discharge to a receiving stream of the bottom partially concentrated waters from an evaporator (3) acceptability of overhead evaporator product water for reuse as boiler make-up or other uses. The waste waters from biological treatment--lagoon and activated sludge units--and from primary treatment facilities--API separator and air flotation--were partially evaporated in rotating thin-film or columnar falling film evaporators. Toxicity of original sample and overhead and bottom product fractions from evaporator was evaluated by static bioassays with fathead minnows (Pimephales promelas) and small crustaceans (Daphnia magna). Major cations: sodium, calcium, magnesium and potassium and trace heavy metals--copper, cadmium, chromium, nickel, lead, iron and zinc, were

analyzed with atomic absorption spectrophotometry. Chlorides and ammonia were analyzed with specific ion electrodes. Organic carbon concentration was analyzed with a Beckman Total Organic Carbon Analyzer. Highly toxic fractions from evaporators were solvent extracted to obtain samples of organic compounds for identification with gas chromatography mass spectrometry. Conclusions were that partial evaporation of biologically treated oil refinery waste water (1) removes toxic substances from biologically treated oil refinery waste waters (2) produces an overhead product water which has low inorganic salt concentration and should be reusable for boiler make-up or other uses where high-quality water is desirable (3) produces a partially concentrated bottom product water generally less toxic.
W74-12348

FREEZE CONCENTRATION OF TOXIC POLLUTANTS FOR BIOASSAY,
Oregon State Univ., Corvallis. Water Resources Research Inst.
For primary bibliographic entry see Field 5A.
W74-12349

SOCIO-ECONOMIC IMPACT OF ESTUARINE THERMAL POLLUTION,
MetroStudy Corp., Washington, D.C.
J. S. Williams, Jr., and S. Spigel.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 034, $4.50 in paper copy, $2.25 in microfiche. Completion Report, 1974. 117 p, 4 fig, 37 tab, 2 append. OWRT C-4134(No. 9059)(1). 14-31-0001-9059.

Descriptors: *Thermal pollution, *Estuarine environment, *Social impact, *Economic impact, *New Jersey, Political aspects, *Recreation, Estuaries, Water pollution effects, Nuclear powerplants, *Attitudes, Benefits, *Cost-benefit analysis.
Identifiers: *Barnegat Bay(NJ).

The impact of thermal pollution from a nuclear power plant on people is indirect and is mediated by the perceived economic impact as well as the perceived environmental impact. Attitudes toward the power plant are primarily a function of the economic impact and secondarily a function of environmental attitudes. Residents who felt they derived economic advantage from a power plant tended to deny any adverse environmental impact. While strong feelings toward nature were associated with negative attitudes toward construction of another nuclear plant, participation in a particular sport or recreational activity provided no basis for prediction of a favorable or unfavorable attitude to the plant. For the immediate area around the Barnegat Bay estuary, the economic analysis showed a favorable ratio of benefits to costs. However, there was a poor distribution of impacts, so that some groups incurred greater costs than benefits. Technical assistance to local political bodies could lead to an early identification of economic disbenefits to local interests and lead to the establishment of a more equal distribution of benefits and costs.
W74-12353

IMPACT OF FOREST MANAGEMENT PRACTICES ON THE AQUATIC ENVIRONMENT,
Quinault Indian Reservation, Taholah, Wash. Quinault Resource Development Program.
B. J. Allee, and M. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 040, $3.00 in paper copy, $2.25 in microfiche. Completion Report, (1974). 21 p, 1 tab, 9 fig. OWRT C-4370(No. 9054)(1).

Descriptors: *Forest management, Watershed management, *Salmonids, *Washington, *Productivity, Fish management, Acid streams, Water quality, Toxicity, Hydrogen ion concentration, Forest soils, *Clear-cutting, Organic matter, *Indian reservations.
Identifiers: Cedar leachate, Total organic carbon, *Quinault Indian Reservation(Wash).

An integrated systems approach has been adopted to determine the effect of forest clear cutting practices on the variation in production of resident salmonids on the Quinault Indian Reservation, a part of the Washington Olympic Peninsula. Resident salmonid production was found to range from .01 g/m2 to over 8 g/m2. Streams low in productivity are characterized by high concentrations of organic materials greater than 50 ppm TOC, larger temperature variations and greater variation in stream discharge. Temporal reduction of salmonids occurred during early fall and coincided with drastic reduction in stream pH levels from greater than 5.5 to less than 4.0. Attempts to distinguish between variation in natural water quality and that caused by forest clear cutting will be made in Phase II of the project.
W74-12355

BASIC RESEARCH IN THE AQUATIC ENVIRONMENT: EFFECTS OF EUTROPHICATION ON PHYTOPLANKTON AND SELECTED SPECIES OF AQUATIC VASCULAR PLANTS-PHASE II,
Cornell Univ., Ithaca, N.Y. Dept. of Ecology and Systematics.
J. P. Barlow.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 108, $3.00 in paper copy, $2.25 in microfiche. Completion Report, Water Resources and Marine Sciences Center, Cornell University, Ithaca, New York, September 1974. 18 p, 4 fig, 18 ref. OWRT B-024-NY(4).

Descriptors: Aquatic environment, *Eutrophication, Effects, *Phytoplankton, *Water quality control, *Nutrients, *Research, Ponds, *Aquatic plants, Growth, Seasonal, Water resources, Management, *New York.
Identifiers: Continuous flow methods, Chemostats, *Cayuga Lake(NY).

An understanding of the effects of specific nutrients on existing plankton populations is necessary for the proper management of water resouces quality control. Recently, nutrient bioassay techniques have been widely used in experiments to identify limiting nutrients and predict the consequences of changes in them. These experiments suffer from numerous disadvantages, an important one being that they are performed under static conditions. It is recommended that continuous flow techniques provide more natural, suitable conditions for determining the effects of nutrients on algal populations. Frequently in such techniques, a chemostat containing the microorganisms is supplied with a nutrient medium at a constant slow rate, displacing a fixed proportion of the contained population via a constant level overflow. Recently, continuous culture has been used to study the selective effect of organic enrichment on natural populations of marine bacteria, and present studies are an extension of this approach. Described are the method used and results found in such experiments made during the winter of 1971-72 in an experimental pond, and shortly after in Lake Cayuga. (See also W74-06835) (Bell-Cornell)
W74-12365

INFLUENCE OF THE WATER POLLUTION,
World Health Organization, (Denmark). Regional Office for Europe.
A. Jernelov.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973. p 115-121, 1973. 1 tab.

Descriptors: *Water pollution effects, *Water pollution sources, *Pulp wastes, *Bleaching wastes, Toxicity, Fish, Aquatic organisms, Anaerobic conditions, Surfactants, Discharge(Water), Pollutants, Color, Lignins, Biodegradation, Biochemical oxygen demand, Organic loading, Chlorination, Polychlorinated biphenyls, Water reuse, Waste treatment, Waste water treatment, Bottom sediments, Fibers(Plant), Eutrophication, Thermal pollution, Mixing, Nutrients, Recreation.

Adverse effects of pulp and paper mill effluents on receiving streams are discussed. They include toxic (lethal and sublethal) effects on fish and other aquatic organisms, color caused by lignin, BOD loading, creation of anaerobic conditions, thermal pollution, formation of PCB (polychlorinated biphenyls) during pulp bleaching with chlorine, changes in nutrient balance, eutrophication, changes in the mixing behavior of water due to discharges of surfactants, persistence of difficulty biodegradable pollutants which aggravate water purification and reuse, fibrous bottom sediments or floating fiber banks that interfere with recreational and esthetic water uses. (See also W74-12400) (Brown-IPC)
W74-12406

STUDY ON THE TOXICITY ON FISHES AND THE BIODEGRADABILITY OF THE PAPER-MILL WASTES, IN RELATION TO THE BIOCIDES USED,
Ente Nazionale per la Cellulosa e per la Carta, Rome (Italy).
M. Firpi, and V. Scarlata.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 449-489, 1973. 34 fig, 5 tab, 44 ref.

Descriptors: *Toxicity, *Pulp wastes, *Fish, *Pesticide toxicity, *Biodegradation, *Additives, *Water pollution effects, *Water pollution sources, Pesticides, Fungicides, Sulfur compounds, Mercury, Chlorinated hydrocarbon pesticides, Bromine, Organic pesticides, Trout, Rainbow trout.
Identifiers: Board mills, Slimicides, White water(Paper-machine), Mercury compounds, Bromine compounds, Tin compounds, Tin, Metal-organic(Organometal) compounds, Parchment paper(Vegetable parchment), Goldfish(Carassius auratus).

The toxicity of five slimicides and fungicides commonly used in pulp and paper mill water circuits was studied on goldfish (Carassius auratus) and rainbow trout (Salmo gairdneri), and compared with the toxic effects on effluents from linerboard, coated board, and vegetable parchment (parchment paper) mills. The biocides included pentachlorophenol sodium salt, organic tin compounds, phenylmercuric acetate, 2-bromo-4-hydroxy-acetophenone, and a mixture of 2-thiocyanomethylthiobenzothiazole plus 2-hydroxypropylemthane-thiosulfonate. The data obtained were correlated with the biodegradability of paper-machine white waters in the presence of microorganism nutrients. Among the most important findings were: Most biocides retard or inhibit the biodegradation of waste waters. Among the five pesticides tested, the Br compound was the most toxic and, along with the Hg compound and the sulfur compound mixture, must be considered as dangerous to the environment. These three compounds would interfere with the self-purification of streams and with natural BOD-removing microorganisms, such as activated sludge bacteria. Waters containing these additives tended to retain a low pH. Nonetheless, most paper mill effluents impose lower pollution loads on receiving streams than do the discharges of many other industries. (See also W74-12400) (Brown-IPC)
W74-12419

OCCUPATIONAL EXPOSURE TO INORGANIC COMPOUNDS OF LEAD,
Institute of Occupational Health, Zabrze (Poland). Dept. of Industrial Toxicology.
For primary bibliographic entry see Field 5A.
W74-12483

BERYLLIUM.
For primary bibliographic entry see Field 5A.
W74-12487

URINARY LOW-MOLECULAR-WEIGHT PROTEINS IN ITAI-ITAI DISEASE,
Gunma Univ., Maebashi(Japan). Dept. of Hygiene.
K. Nomiyama, Y. Sugata, I. Murata, and Y. Nakagawa.
Environmental Research, Vol 6, No 4, p 373-381, December, 1973. 1 tab, 3 fig, 26 ref.

Descriptors: *Cadmium, *Toxicity, *Human pathology, *Urine, Diets, *Proteins, Water pollution effects.
Identifiers: *Itai-Itai disease, *Japan(Zinzu River).

The etiology of the so-called Itai-Itai disease has been thought to relate to malnutrition and dietary cadmium exposure. Itai-Itai disease, named after its severe pain, was endemic in Zinzu River area in Japan; its characteristic signs and symptons were osteomalacia and renal tubular dysfunction. Urinary low-molecular-weight proteins have been reported to be characteristic of renal tubular dysfunction. The components of urinary low-molecular-weight proteins in Itai-Itai disease are suggested to be retinol-binding protein and beta 2-microglobulin as determined by gel filtration, disc electrophoresis and immunoassay. Furthermore, vitamin D administration at a large dose is discussed and though to contribute to the aggravation of renal tubular dysfunction in Itai-Itai disease. (Jernigan-Vanderbilt)
W74-12490

MERCURY POISONING TAKES ITS TOLL IN JAPANESE FISHERMEN AND FAMILIES,
M. Nozaki.
Journal of Environmental Health, Vol 36, No 6, p 552-553, May/June, 1974. 1 fig, 7 photo.

Descriptors: *Mercury, *Toxicity, *Public health, *Human pathology, Organic compounds, Industrial wastes, Contaminants, Pollutants, Food, *Water pollution effects.
Identifiers: *Methylmercury, *Japan(Minamata Bay).

The effects of methylmercury pollution of the fishermen of Minamata Bay from 1953 to 1974 are summarized. In 1956, Dr. Takeuchi began investigations of the outbreak of a heretofore unknown disease. In 1963 he reported that methylmercury was definitely the active agent affecting the nervous system. 674 cases of Minamata Disease have been officially reported as of February 8, 1974, including 90 deaths. Photographs of victims are presented. (Jernigan-Vanderbilt)
W74-12491

CADMIUM IN THE ENVIRONMENT, II,
Karolinska Institutet, Stockholm (Sweden). Dept. of Environmental Hygiene.
For primary bibliographic entry see Field 5B.
W74-12492

BIOLOGICAL DIFFERENCES IN CADMIUM AND ZINC TURNOVER,
Oklahoma Univ., Oklahoma City. Dept. of Environmental Health.
Z. A. Shaikh, and O. J. Lucis.
Archives of Environmental Health, Vol 24, No 6, p 410-418, June, 1972. 6 fig, 3 tab, 30 ref.

Descriptors: *Cadmium, *Zinc, *Biochemistry, *Rodents, Mammals, Laboratory tests, Laboratory animals, Analytical techniques, Electrophoresis, Path of pollutants, Radioisotopes.

In rat plasma, Cd109 was mainly associated with alpha-globulin fraction and Zn65 was bound to alpha- and beta-globulins. Subcutaneously injected cadmium chloride Cd109 and zinc chloride Zn65 resulted in rapid clearance of Cd109 from blood plasma, as compared to Zn65. Blood cells accumulated Zn65 more rapidly than Cd109. Greatest uptakes of Cd109 per unit weight of tissue were by liver, kidneys, and pancreas, but that of Zn65 was by the pancreas. From all tissues, Zn65 was depleted eventually. In the first six hours after isotope dose, testis tissue concentrated more Cd109 than Zn65. In tests, Zn65-influx continued for 168 hours, without further Cd109 increase. Both isotopes were excreted predominantly via the intestinal tract. Fecal and urinary excretion of Cd109 and Zn65 was accelerated by 2,3-dimercapto-1-propanol. Results indicate Cd109 follows metabolic pathways different from those of Zn65. (Jernigan-Vanderbilt)
W74-12493

PRESYNAPTIC AND POSTSYNAPTIC EFFECTS OF LEAD AT THE FROG NEUROMUSCULAR JUNCTION,
Cincinnati Univ., Ohio. Coll. of Medicine.
R. S. Manalis, and G. P. Cooper.
Nature, Vol 243, p 354-356, June 8, 1973. 4 fig, 28 ref.

Descriptors: *Lead, *Animal physiology, Laboratory tests, Testing procedures, *Frogs, Lethal limit.
Identifiers: Sublethal effects, *Synaptic effects.

Lead has long been known to be toxic to animals and humans, with some of its effects being attributable to actions on the neuromuscular system. It is shown that lead influences both pre- and postsynaptic events in neuromuscular transmission with the presynaptic ones being most sensitive. Experiments were performed in vitro on the isolated sciatic nerve-sortorius muscle preparation of the frog (Rana pipiens). Superficial neuromuscular junctions were located optically with a compound microscope (X400) standard microelectrode and photographic techniques were used to monitor intracellular responses from individual end-plates. It was concluded that lead reduced the end-plate potential by a presynaptic block and not by a postsynaptic one. To confirm this conclusion, other experiments were performed to see if lead decreased the ACh sensitivity of the postsynaptic (end-plate) membrane. The results showed that lead can only block postsynaptically in conditions in which the density of ACh-receptor complexes is much lower than it is during an end-plate potential. (Jernigan-Vanderbilt)
W74-12494

MATERNAL-FETAL TRANSFER OF ORGANIC AND INORGANIC MERCURY VIA PLACENTA AND MILK,
Vanderbilt University, Nashville, Tennessee.
For primary bibliographic entry see Field 5B.
W74-12495

CHARACTERISTICS OF BACTERIOPLANKTON OF THE URAL RIVER IN THE ORENBURG REGION, (IN RUSSIAN),
Gosudarstvennyi Meditsinskii Institut, Orenburg (USSR). Dept. of Biology.
G. N. Solovykh.
Mikrobiologiya. Vol 42, No 2, p 336-339, 1973. English summary.
Identifiers: *Bacteria, Orenburg, *Plankton, *USSR(Ural River).

The bacterioplankton of the Ural river (USSR) and its seasonal dynamics were studied. The total bacterial number in waters of the Ural river near Orenburg was 300-3338 1,000 cells/ml. The maximum bacterial numbers were detected in the spring and in the autumn. The number of saprophytic bacteria in the river varied from 200-44,000 cells/ml with the minimum in winter and the maximum in summer autumn. The coli-index was 200-1400 cells/L and only sometimes reached 28,00 cells 1. The number of bacteria oxidizing hydrocarbons was 10-1,000,000 cells/mn. Desulfurating bacteria were rarely distributed in the Ural river, and their number was low. The qualitative composition of the bacterioplankton was varied. The waters contained spore-forming bacteria, various rods, cocci, azotobacter-like cells, and yeasts. The ratio between rods and cocci was 1:3.--Copyright 1973, Biological Abstracts, Inc.
W74-12497

METHYLMERCURY-INDUCED CHROMOSOME DAMAGE IN MAN,
University Hospital, Lund (Sweden). Dept. of Occupational Medicine.
S. Skerfving, K. Hansson, C. Mangs, J. Lindsten, and N. Ryman.
Environmental Research, Vol 7, No 1, p 83-98, February, 1974. 2 fig, 5 tab, 30 ref. SNEPB (7-29/68 and 7-15/71) SMRC 19X-3681.

Descriptors: *Mercury, *Organic compounds, *Chromosomes, *Cytological studies, Biology, Genetics, Fish, Public health, Human pathology, Laboratory tests, Testing procedures, Water pollution effects.
Identifiers: *Methylmercury.

Lymphocytes from blood cultures from 23 subjects exposed to methylmercury through intake of fish from contaminated waters and from 16 'nonexposed' subjects were studied cytogenetically. These were statistically significant relationships between frequencies of cells with chromatid-type aberrations, 'unstable' chromosome-type aberrations, and aneuploidy on the one hand and blood-cell mercury levels on the other. In the exposed subjects the blood-cell/plasma mercury ratio was high, which is chracteristic for exposure to short-chain alkylmercury compounds as opposed to the low ratio seen at exposure to inorganic mercury. Some of the exposed subjects approached, and in one case by far exceeded, the level of 400 ng/g blood cells, assumed to have been present in sensitive subjects suffering nervous system damage. However, none of the persons studied showed clinical evidence of methylmercury poisoning. The significance of these findings for the health of the subjects and their offspring is not known. In 11 of the exposed subjects, repeated samples were obtained during periods of 6 months to 3 years. No statistically significant relationship between variations in blood-cell mercury and chromosome aberrations could be established. (Jernigan-Vanderbilt)
W74-12503

RETENTION OF TWO MERCURIALS BY STRIPED MULLET, MUGIL CEPHALUS,
National Marine Water Quality Lab., Johns Island, S.C.
For primary bibliographic entry see Field 5B.
W74-12504

COMPARISON OF CADMIUM 115M RETENTION IN RATS FOLLOWING DIFFERENT ROUTES OF ADMINISTRATION,
National Water Quality Lab., Cincinnati, Ohio. Newtown Fish Toxicology Lab.
For primary bibliographic entry see Field 5B.
W74-12505

COUGH RESPONSE AND UPTAKE OF MERCURY BY BROOK TROUT, SALVELINUS FONTINALIS, EXPOSED TO MERCURIC COM-

POUNDS AT DIFFERENT HYDROGEN-ION CONCENTRATIONS,
National Water Quality Lab., Duluth, Minn.
R. A. Drummond, G. F. Olson, and A. R. Batterman.
Transactions of the American Fisheries Society, Vol 103, No 2, p 244-249, April, 1974. 3 fig, 1 tab, 17 ref.

Descriptors: *Mercury, *Brook trout, *Organic compounds, *Lake Superior, *Toxicity, Laboratory tests, Laboratory animals, Fish, Testing procedures, Analytical techniques, Spectroscopy, Absorption, Hydrogen ion concentration.

The lowest concentration of methylmercuric chloride (MMC) and mercuric chloride added to Lake Superior water that caused a significant increase in cough frequency in brook trout was 3 micrograms Hg/liter. Cough frequency is a good short-term indicator of the long-term effects of MMC. The response can be used to predict the safe concentration of mercuric chloride since the long-term effects of this compound are not known. Increases in cough frequency were proportional to the concentration (from 3 to 12 micrograms Hg/liter) of both compounds at pH 7.5. The fish were more responsive to MMC when the pH of the test water was lowered to 6.0; response to mercuric chloride was not changed by lowered pH. Fish exposed to MMC at pH 6.0 contained more total mercury in their gills and red blood cells than fish tested at pH 9.0. The uptake of mercury by brook trout exposed to mercuric chloride did not differ significantly at pH 6.0 and 9.0. (Jernigan-Vanderbilt)
W74-12507

ZINC, COPPER, MANGANESE IN THE RAZOR CLAM, SILIQUA PATULA,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W74-12511

LEAD CONCENTRATIONS IN THE WOOLY SCULPIN CLINOCOTTUS ANALIS, COLLECTED FROM TIDEPOOLS OF CALIFORNIA,
California Univ., Los Angeles. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W74-12515

UNIVERSITY OF TORONTO STUDIES REVEAL TOXIC METALS IN SLUDGES USED FOR SOILS.
For primary bibliographic entry see Field 5B.
W74-12516

'NORMAL' LEAD AND CADIUM CONTENT OF THE HUMAN KIDNEY,
Veterans Administration Hospital, Birmingham, Ala. Trace Metals Lab.
J. M. Morgan.
Archives of Environmental Health, Vol 24, No 6, p 364-368, June, 1972. 4 tab, 36 ref.

Descriptors: *Lead, *Cadmium, *Human pathology, *Spectroscopy, Absorption, Distribution, Average, Pollutant identification.
Identifiers: *Kidney(Human), Background levels, Hypertension.

Cadmium and lead have been shown to cause hypertension, accelerated atherosclerosis, kidney disease, and neoplasia in experimental animals. Since both metals accumulate in the kidney, renal concentrations may reflect prolonged exposure. To evaluate effects of long-term moderate exposure, 'normal' concentration must first be established in man on the basis of autopsy studies. Increased renal lead was not associated with hypertension or neoplasia, although longevity was compromised as a result of clinical lead poisoning. Renal cadmium has been previously shown to be increased in man in association with neoplasia and emphysema. (Rowe-Vanderbilt)
W74-12517

PREVENTION OF LONG-TERM SEQUELAE FOLLOWING THE ABSORPTION OF LEAD,
Chloride Electrical Storage Co. Ltd., Manchester (England).
D. Malcolm.
Archives of Environmental Health, Vol 23, No 4, p 295-298, October, 1971. 2 tab, 28 ref.

Descriptors: *Pollution abatement, *Lead, *Absorption, *Human pathology, Environmental control, Distribution, Mortality, Industrial wastes, *Air pollution effects.
Identifiers: Hypertension, *Sequelae.

The initiation, in 1927, of modern measures of environmental control and medical supervision has reduced greatly the severity of exposure of employees of a storage batter factory to lead and has eliminated the occurrence of outright lead poisoning. An attempt was made to determine the extent to which the chronic effects of low-grade exposure to lead had been prevented by comparing the mortality and incidence of vascular hypertension and fatal cerebrovascular accidents among retired and currently employed persons of record with that of employees of a much later period, during which inplant exposure to lead has been reduced to levels now considered to be safe. (Rowe-Vanderbilt)
W74-12518

CHROMIUM COMPLEXES WITH PROTEINS AND MUCOPOLYSACCHARIDES AND THEIR RELATIONSHIP TO CHROMIUM ALLERGY IN SENSITIZED GUINEA PIGS,
Pennsylvania Univ., Philadelphia. Dept. of Dermatology.
S. A. Katz, D. M. Scheiner, A. W. Klein, and M. H. Samitz.
Environmental Research, Vol 7, No 2, p 212-219, April, 1974. 4 fig, 1 tab, 10 ref. HEW (HO 00303) PHS (AM 0526).

Descriptors: *Chromium, *Proteins, *Laboratory animals, Animal physiology, Small animals(Mammals), Laboratory tests, Testing procedures.
Identifiers: *Chromium allergy, Guinea pigs.

The role of proteins and mucopolysaccharides as carriers for chromium in allergic eczematous dermatitis has been described by other investigators. This study is an attempt to extend these previous findings to a model for chromium allergy in chromium sensitized guinea pigs and to study the binding of chromium to proteins and mucopolysaccharides. Theoretical considerations and equilibrium dialysis were utilized to refute previous reports on the amounts of chromium that can be complexed to proteins and mucopolysaccharides. Purified chromium complexes containing no free chromium were then used to test chromium --- sensitized guinea pigs. The chromium-albumin complex is the only one of those studied found to reproducibly elicit a response. It was concluded that chromium-complexes are not directly involved in the allergic response mechanism, but at this time the apparent discrepancy associated with the chromium-mucopolysaccharide complexes cannot be explained. (Jernigan-Vanderbilt)
W74-12519

COMPARTMENTAL ANALYSIS FOR THE EVALUATION OF BIOLOGICAL HALF-LIVES OF CADMIUM AND MERCURY IN MOUSE ORGANS,
Tokyo Univ. (Japan). School of Health Sciences.
For primary bibliographic entry see Field 5B.
W74-12520

A METHOD TO MONITOR THE EFFECTS OF TOXICANTS UPON BREATHING RATE OF LARGEMOUTH BASS (MICROPTERUS SALMOIDES LACEPEDE),
National Inst. for Water Research, Pretoria, (South Africa); and Council for Scientific and Industrial Research, Pretoria (South Africa).
W. S. G. Morgan, and P. C. Kuhn.
Water Research, Vol 8, No 1, p 67-77, January, 1974. 10 fig, 3 tab, 18 ref.

Descriptors: *Monitoring, Pollutants, *Bass, Micropterus species, Laboratory animals, Fish, *Industrial wastes, Copper, Cadmium, Cyanide, Instrumentation, Testing procedures, Water pollution effects, *Respiration.
Identifiers: *Fish respiration disease.

Research into the effects of toxicants upon opercular rhythm has already established a distinct relationship between pollution and respiratory activity in fish. The purpose of this research was not only to confirm that the system may be used for a wide range of industrial pollutants, but also to attempt to delineate the limit of respiratory response to various acute and sub-lethal concentrations of toxicants. An apparatus was designed to measure continuously the effects of nominal concentrations of copper, cadmium, phenol, ammonia, and cyanide upon breathing rates in largemouth bass. Acute and sublethal toxic effects were indicated in a majority of cases by increased breathing rate. The use of this reaction and the monitoring apparatus to monitor a wide range of industrial pollutants was shown to be practicable. Consideration is also given to its possible application in local situations. (Jernigan-Vanderbilt)
W74-12522

EFFECTS OF SIMULTANEOUS VARIATIONS OF DIEL CHANGES OF TEMPERATURE, DISSOLVED OXYGEN, SALINITY, AND A POLLUTANT ON THE GROWTH OF WHITE CATFISH,
Connecticut Univ., Storrs. Inst. of Water Resources.
W. R. Whitworth.
Completion Report, 1974. 5 p, 1 tab. OWRT A-036-CONN(1). 14-31-0001-3207.

Descriptors: Water pollution effects, Fish physiology, *Growth rates, *Toxicity, *Aluminum, *Water temperature, *Dissolved oxygen, *Sodium chloride, Fishkill, *Catfishes, Salinity, Bioassay.
Identifiers: Fish toxicology, *Alum, White catfish.

Three long-term bioassays (8, 79 and 156 days) were performed in closed growth chambers with continuous waterflow to determine the growth and mortality responses of white catfish (Ictalurus catus L.) exposed to 2 diurnally fluctuating temperature and oxygen ranges and 3 diurnally fluctuating dissolved aluminum as alum (Al2 (SO4)3 . 14H20) and sodium chloride levels. One long-term bioassay(242 day) was performed in open tanks to determine growth responses of white catfish to 2 diurnally fluctuating temperature ranges and 2 diurnally fluctuating dissolved aluminum (as alum) and sodium chloride levels. Short-term bioassays (24, 48 and 96 hours) were performed on 8 species of freshwater and estuarine fishes and the stability of alum solutions was measured. Reduced growth rates and mean weights were exhibited by white catfish exposed to the highest fluctuating levels of temperature, oxygen, aluminum and sodium chloride. Eight species of fish had 96-hour TLM's (concentration at which 50% of the specimens would die) of 8.0 to 21.9 mg/liter Al. Aluminum solutions (15 and 50 mg/liter) were reduced at rates of .021 to .271 and .104 to .167 mg/liter/hr. (deLara-Connecticut)
W74-12524

MARITIME SANDS,
For primary bibliographic entry see Field 2L.
W74-12556

STUDIES ON SOUTH AMERICAN FRESHWATER PLANKTON. NOTES ON THE PLANKTON FROM TIERRA DEL FUEGO AND VALDIVIA,
Uppsala Univ. (Sweden). Inst. of Plant Ecology.
K. Thomasson.
Annales Societatis Tartuensis ad res Naturae Investigandas Constitutate, Vol 1, p 52-64, 1957. 5 fig, 1 tab, 20 ref.

Descriptors: *South America, *Plankton, Freshwater, Temperate, Lakes, Chemical properties, Physical properties, Hydrogen ion concentration, Systematics.
Identifiers: *Tierra del Fuego(Argentina), *Valdivia(Chile).

Plankton species collected in 1940 from lakes in Tierra del Fuego and Valdivia are described. Water samples collected at the same time from Lago Fagnano, Lago Roca, Cabecera Lago, and Laguna de la Peninsula, Tierra del Fuego were analyzed in Uppsala for transparency, color, hydrogen ion concentration, conductivity, iron, manganese, chlorine, sulfate, total phosphorus, and total nitrogen. The pH was measured in situ. Some of the plankton species collected at Tierra del Fuego and Valdivia were new and are described with notes and drawings. (Auen-Wisconsin)
W74-12557

THE VEGETATION OF SWEDISH LAKES,
G. Lohammar.
Acta Phytogeographica Suecica, Vol 50, p 28-48, 20 fig, 41 ref.

Descriptors: *Aquatic plants, *Lakes, *Distribution, Geomorphology, Shores, Phosphorus, Nitrogen, Acidity, Turbidity, Systematics, Eutrophication, Oligotrophy, Temperature, Chemical properties, Light penetration, Water level fluctuations, Littoral.
Identifiers: *Sweden.

There are an estimated 96,000 lakes in Sweden, only a few of the larger in existence before glaciation. The temperature in July is about the same in all lowland Sweden; from the Gulf of Bothnia summer temperatures decrease to the west with increasing altitude. Dissolved substances vary within wide limits, the majority having low contents of dissolved minerals. Phosphorus and nitrogen are generally minimal, the highest values measured in lakes of the clayey plains where human habitation and agriculture increase the nutrient input. Most lakes have a neutral or weakly acid water with a summer pH between 6 and 8. Water transparency is probably below 3 m in most lakes. Aquatic plants occur all over Sweden--except in the alpine regions. The three most important helophytes are Phragmites, Scirpus lacustris and Equisetum fluviatile. In the oligotrophic lakes of southern Sweden, during summer low water, the exposed flowering mats of Litorella and in shallow water close to shore, large stands of flowering Lobelia appear, intermingled with Isoetes lacustris. Vascular aquatics are listed according to distribution. Changes in aquatic vegetation are recorded resulting from meiotrophy, climatic change, and human influence. (Jones-Wisconsin)
W74-12558

NOTES ON THE PLANKTON OF LAKE BANGWEULU,
K. Thomasson.
Nova Acta Regiae Societatis Scientiarum Upsaliensis, Ser IV, Vol 17, No 12, p 3-43, 14 fig, 2 tab, 97 ref.

Descriptors: *Algae, *Plankton, *Africa, Lakes, Swamps, Systematics, Tropical regions, Aquatic plants, Distribution, Vegetation.
Identifiers: Lake Bangweulu(Rhodesia), Desmids.

The eastern shore of Lake Bangweulu, Northern Rhodesia merges into the vast Bangweulu Swamp containing many open pools and small lakes from which plankton samples were collected. In spite of the random character of the samples there were a great variety of taxa present, many of them of great geographical and/or taxonomical interest. They are listed and extensive notes given. In the small Lake Wumba the following plants were frequent in the sample: Desmidium occidentale, Closterium kuetzingii, Micrasteria foliacea, and M. radiata. In the swamp Lake Chali, the dominant phytoplankter was Botryococcus braunii. In Lake Chaya, another swamp lake, the plankton community was dominated by Oscillatoria limosa, Melosira granulata, and M. nyassensis. M. agassizii is extremely rare. From Bwalya Mponda Lagoon a sample contained great quantities of detritus and sterile threads of Spirogyra. From an arm of Lake Bangweulu, the plankton composition was close to that of Lake Bangweulu, but instead of Zygnemales, it was dominated by Cyanophyta. One of the most interesting points is the discovery of many asymmetrical desmids, which seem to be sparse but widely distributed. (Jones-Wisconsin)
W74-12559

ECOLOGICAL EFFICIENCY OF A PELAGIC MYSID SHRIMP: ESTIMATES FROM GROWTH, ENERGY BUDGET, AND MORTALITY STUDIES,
National Marine Fisheries Service, La Jolla, Calif. Fishery-Oceanography Center.
R. I. Clutter, and G. H. Theilacker.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-10522. Fishery Bulletin, Vol 69, No 1, p 93-115, 1971. 15 fig, 8 tab, 60 ref. (Report No. NOAA-73030901-4). NSF-GB 7132.

Descriptors: *Energy budget, *Productivity, *Shrimp, Reproduction, Fecundity, Larvae, Biochemistry, Metabolism, Respiration.
Identifiers: Metamysidopsis elongata, Molting rates.

Energy units provide a means of expressing productivity in terms common to all organisms. Through laboratory studies of growth, molting, reproduction, respiration, body composition, and energy content, an energy budget was constructed for the pelagic mysid shrimp Metamysidopsis elongata. The energy budget data, together with estimates of natural population mortality rates, are used to estimate net and gross ecological efficiencies for the field population. Average growth and molting rates were determined by rearing the mysids in the laboratory. Size specific fecundity was determined from field and laboratory observations. The calorie contents of the mysids, their molts, eggs and larvae were estimated by bomb calorimetry and partially from biochemical composition. The energy used in metabolism was calculated from size specific respiration and data on body composition. The amount of energy lost in molts varies with age because the size of the molt increases and the molting frequency decreases. The net ecological efficiency (yield/assimilated) of a population of Metamysidopsis elongata (Crustacea, Mysidacea) is estimated to be 32%. The gross ecological efficiency (yield/ingested) is probably between 19% and 29%. (Jones-Wisconsin)
W74-12561

THE BIOLOGY OF BLUE-GREEN ALGAE.
University of California Press, Berkeley and Los Angeles. 1973. 676 p.

Descriptors: *Biology, *Cyanophyta, Metabolism, Synthesis, Plant physiology, Cytological studies, Photosynthesis, Structure, Chemical properties, Lipids, Proteins, Pigments, Genetics, Viruses, Nitrogen fixation, Movement, Plankton, Ecology, Marine algae, Hot springs, Carbon, Systematics, Evolution, Cultures, Carbonates, Algae.
Identifiers: Nucleic acids, Heterocysts, Collections, Anacystis nidulans, Thermophilic algae.

This compilation of studies on blue-green algae gives an account of most aspects of blue-green algal biology that are of general interest, or are currently the subject of particularly marked attention especially in relation to environmental deterioration. Few changes in taxonomy of blue-green algae have taken place in the past forty years, but knowledge of their morphology has been recast and expanded by electron microscopy. A wide variety of disciplines for study of the blue-green algae have been employed and are recorded in this volume. Significant was the separation of prokaryotic types. The implication of the 'bacterial-nature' of blue-green algae with the consequent anomaly of their possessing a higher-plant type photosynthetic system, has called for increased attention. Some of the 25 papers, for example, discuss the synthesis of metabolic intermediates, metabolic control and autotrophic physiology, structure and function of nucleic acids, mutagenesis and genetic recombination, nitrogen fixation, photomorphogenesis and nostocacean development, physiology and ecology of marine blue-green algae, ecology of blue-green algae in hot springs, and autotrophy and heterotrophy in unicellular blue-green algae. The four appendices give a list of culture collections and techniques for culture. (See W74-12563 thru W74-12591) (Jones-Wisconsin)
W74-12562

SYNTHESIS OF METABOLIC INTERMEDIATES,
Wales University Coll. of Wales, Aberystwyth. Dept. of Biochemistry.
A. J. Smith.
In: The Biology of Blue-Green Algae, p 1-38. University of California Press, Berkeley and Los Angeles, 1973. 5 fig, 5 tab.

Descriptors: *Synthesis, *Metabolism, *Cyanophyta, Photosynthesis, Carbon dioxide, Plant growth, Organic compounds, Light, Enzymes, Biochemistry, Plant physiology, Algae.
Identifiers: *Metabolic intermediates, Photoassimilation, Obligate phototrophs.

Much work on the intermediary metabolism of blue-green algae has been directed to the elucidation of the biochemical basis of their obligate growth characteristics. Many species, both filamentous and unicellular, have been shown to assimilate a wide range of organic compounds in the light and to incorporate them into a variety of metabolically related cell constituents. Studies show that blue-green algae like their obligately chemolithotrophic counterparts are not generally impermeable to organic compounds and are therefore not restricted to carbon dioxide as the carbon source. Those species which are apparently unable to grow on organic media in the dark (all unicellular and many filamentous species) are best classified as obligate phototrophs; this places the emphasis more on the energy source rather than the carbon source for although these organisms can utilize organic compounds in cell synthesis many appear unable to dispense with light for significant growth. Existence of specific metabolism lesions in cyanophytes raises possibility that the obligate character of many may be due to specific enzyme deficiencies preventing or severely limiting dark heterotrophic growth whilst permitting growth in light. It is not possible to identify with certainty the biochemical basis of their obligately phototrophic physiology. (See also W74-12562) (Jones-Wisconsin)
W74-12563

METABOLIC CONTROL AND AUTOTROPHIC PHYSIOLOGY,
Liverpool Univ. (England). Dept. of Biochemistry.
N. G. Carr.

In: The Biology of Blue-Green Algae, p 39-65, University of California Press, Berkeley and Los Angeles, 1973. 6 fig, 4 tab.

Descriptors: *Cyanophyta, *Metabolism, *Plant physiology, Carbon, Growth rates, Respiration, Enzymes, Amino acids, Synthesis, Biochemistry, Cytological studies, Algae.
Identifiers: *Autotrophic physiology, Electron transport, Biosynthesis, Cytochromes.

Studies with obligate phototrophs on the assimilation of organic material, oxidative and dark electron-transport activities, and control of enzymic activity are summarized. The relationship of these processes to the growth physiology of some blue-green algae is examined. Autotrophs are defined as organisms that require an energy source other than oxidation of reduced carbon. A striking feature of the photo-assimilation of carbon compounds by many blue-green algae, and certainly of Anabaena variabilis and Anacystis nidulans, is the inability of the exogenous carbon source to increase growth or respiratory rates. It has been established that blue-green algae have low, but consistent rates of oxygen consumption in the dark. Respiratory electron transport is discussed in connection with cytochromes, reduced pyridine nucleotide oxidase systems, and phosphorylation. Regarding control of enzymatic activity, tentative conclusions may be drawn that blue-green algae lack metabolic control by repression and de-repression of enzyme biosynthesis found in other microorganisms. In contrast, examples of enzymic control by allosteric alteration of enzymes, by end-products or substrate precursors, have been observed. No species has been described so far that cannot elaborate a proportion of its cell material from reduced carbon sources. (See also W74-12562) (Jones-Wisconsin)
W74-12564

ARRANGEMENT AND STRUCTURE OF THYLAKOIDS,
California Univ., Davis. Dept. of Botany; and Durham Univ. (England). Dept. of Botany.
N. J. Lang, and B. A. Whitton.
In: The Biology of Blue-Green Algae, p 66-79, University of California Press, Berkeley and Los Angeles, 1973. 17 fig.

Descriptors: *Cyanophyta, *Cytological studies, *Structure, Environmental effects, Light intensity, Plant physiology, Plant morphology, Algae.
Identifiers: *Thylakoids.

The most widespread arrangement of thylakoids (flattened membranous sacs) in cyanophyte vegetative cells is that where some membranes at least can be seen in any region of the cell but where, nevertheless, there is a marked tendency for concentration toward the cell periphery. Where the great majority thylakoids are peripheral, they are generally oriented parallel to the longitudinal cell wall. Direct connections between the plasmalemma and outer thylakoids have been reported in a range of species. While there is considerable variation in arrangement and structure of thylakoids in vegetative cells of blue-green algae, many features found either in cells of photosynthetic bacteria or in most chloroplasts have never been reported for blue-green algae. Effects of light intensity and temperature are reported. Although there have been only a few studies illustrating ultrastructure of akinetes, in general, the arrangement of thylakoids is similar to that in vegetative cells prior to their enlargement and differentiation. While it is becoming relatively easy to provide morphological explanations for some features of the arrangement of thylakoids within blue-green algal cells, there are few clues as to what extent different functions are associated with these different arrangements. (See also W74-12562) (Jones-Wisconsin)
W74-12565

PHOTOSYNTHETIC REACTIONS AND COMPONENTS OF THYLAKOIDS,
Purdue Univ., Lafayette, Ind. Dept. of Biochemistry.
D. W. Krogmann.
In: The Biology of Blue-Green Algae, p 80-98, University of California Press, Berkeley and Los Angeles, 1973. 3 fig. NSF GB 27466.

Descriptors: *Cytological studies, *Biochemistry, *Cyanophyta, Photosynthesis, Pigments, Chlorophyll, Oxidation-reduction potential, Algae.
Identifiers: *Thylakoids, Electron flow, Photosynthetic reactions.

Individual steps in electron flow during photosynthesis and overall sequence of reactions are considered. Use of NADPH as the reductant of phosphoglyceric acid may represent an evolutionary break by the blue-green algae from other photosynthetic prokaryotes. Evidence is appearing that structure of the pigment complexes in blue-green algae can be altered by energy-dependent conformational changes in the photosynthetic membranes. P-700 is the site of conversion of light energy into chemical work in Photosystem I. While there has been some controversy over which redox carrier reduces P-700, current evidence favors the copper protein, plastocyanin. The sequence of electron carriers between the c type cytochrome and Photosystem II is not clear. A sequence plastoquinone, cytochrome b, cytochrome c had been postulated for higher plant materials based on the redox potential but recent revisions in the estimated redox potential of cytochrome b indicate that it reduces plastoquinone which in turn reduces the 'c' type cytochrome. Photosystem II provides the electrons which are sent through the chain of carriers described. The cyclic phosphorylation activity of lamellae from Anabaena variabilis appears to be quite similar to that found in higher plant chloroplasts. (See also W74-12562) (Jones-Wisconsin)
W74-12566

FINE STRUCTURE AND CHEMICAL COMPOSITION OF THE CELL ENVELOPES,
Freiburg Univ. (West Germany). School of Microbiology.
G. Drews.
In: The Biology of Blue-Green Algae, p 99-116. University of California Press, Berkeley and Los Angeles, 1973. 7 fig.

Descriptors: *Cyanophyta, *Structure, *Chemical properties, *Cytological studies, Algae.
Identifiers: *Cell envelopes, Fine structure, Heterocysts, Akinete, Chemical structure.

Cells of prokaryotic organisms are usually enclosed by envelopes. The first envelope external to the cytoplasmic membrane (plasmalemma) is a multilayered structure, the cell wall. Many species have, external to the cell wall, a sheath or capsule which forms a thick and solid outer envelope frequently enclosing several cells, or a thin and dissolving slime layer. In young cross walls both electron-dense layers (L-2) appear to be a single layer. Subsequently the layers are interrupted by a less electron-dense layer, described as the middle lamella. Extracellular mucilage was observed to flow along the surface of trichomes of Oscillatoriaceae and other gliding species. Heterocysts are specialized cells, formed by differentiation of vegetative cells with strong and localized thickenings of the cell wall. The fine structure of the blue-green algal cell wall is similar to that of bacteria. Besides the murein components, carbohydrates, amino acids and fatty acids have been found in cell wall preparations. The mechanism of cell envelope synthesis is probably similar to that found in the bacterial cell. The mode of division, characteristic of filamentous blue-green algae, begins by an invagination of cytoplasmic membrane and peptidoglycan layer. (See also W74-12562) (Jones-Wisconsin)
W74-12567

CYTOCHEMICAL EXAMINATION OF BLUE-GREEN ALGAE,
New York State Dept. of Health, Albany. Div. of Labs. and Research.
G. W. Fuhs.
In: The Biology of Blue-Green Algae, p 117-143. University of California Press, Berkeley and Los Angeles, 1973. 27 fig.

Descriptors: *Cytological studies, *Cyanophyta, *Analytical techniques, Biochemistry, Microscopy, Electron microscopy, Algae.
Identifiers: *Cytochemistry, Autoradiography.

Techniques that have been used successfully in cytochemical examinations of blue-green algae are discussed. An interference microscope translates in an unequivocal manner differences in optical lightpaths as large as several wavelengths into shades of brightness and color, and with compensators and micrometers permits quantitative measurement of refractive index and dry mass content. Gelatinous Cyanophycean sheaths of a polysaccharide nature are best stained with ruthenium red or basic dyes. Cytochemical techniques for the demonstration of nuclear material in Cyanophyceae are identical with techniques used for the demonstration of DNA. Light-microscopic techniques, electron-microscopic, and DNA-autoradiography are used. Ribonucleic acid and ribonucleoprotein account for the cytoplasmic basophilia in the blue-green algae, as demonstrated with light-microscopy. Cyanophyceae form a storage carbohydrate which is a polymer of glucose with a degree of branching between glycogen and amylopectin. Cytochemically this compound resembles glycogen. Polyphosphate granules (also known as metachromatin, metachromatic granules, or volutin) are concretions of linear polyphosphates of high molecular weight demonstrated by light-microscopy and electron-microscopy. The electron-microscopic identification of cyanophycin has been particularly problematic. The light-microscopic reactions of cyanophycin also show some resemblance to those given by bacterial plasmalemmosomes. (See also W74-12562) (Jones-Wisconsin)
W74-12568

LIPID COMPOSITION AND METABOLISM,
Unilever Ltd., Sharnbrook (England). Unilever Research Lab.
B. W. Nichols.
In: The Biology of Blue-Green Algae, p 144-161. University of California Press, Berkeley and Los Angeles, 1973. 5 fig, 5 tab.

Descriptors: *Chemical properties, *Lipids, *Metabolism, *Cyanophyta, Phylogeny, Plant morphology, Pigments, Cytological studies, Algae.
Identifiers: *Fatty acids, Hydrocarbons, Sterols, Poly-beta-hydroxybutyrate, Fatty alcohols, Chemical structure.

The intermediary position held by blue-green algae in the evolution of prokaryotic and eukaryotic organisms is reflected in their unique lipid and fatty acid compositions. Although all higher algae contain numerous classes of phosphoglycerides as well as glycosyldiglycerides, the blue-green algae usually contain only one quantitatively important phospholipid and three glycolipids. Certain blue-green algae usually contain only one quantitatively important phospholipid and three glycolipids. Certain blue-green algae are not unlike many bacteria not only in regard to general cellular morphology but also with respect to fatty acid synthesizing capacity. Existing data for the levels of the tocopherols in the blue-green algae indicate some relationship between the oxidizability of membrane fatty acids and the corresponding cellular tocopherol levels. With a single exception, blue-green algae resemble eukaryotic plants in accumulating plastoquinone A, vitamin K-1 and alpha-tocopherylquinone within the photosynthetic apparatus. Acyl lipids apart, pigments consitute the quantitatively major part of lipid extracts from

blue-green algae. Heterocysts contain substantial quantities of monohexoside derivatives of long-chain polyhydroxy alcohols. Sterols may prove far more widely distributed than was originally believed. The compositional data so far accumulated for the lipid constituents of individual blue-green algae underline the dangers of correlating molecular complexity with evolutionary status. (See also W74-12562) (Jones-Wisconsin)
W74-12569

BILIPROTEINS AND BILE PIGMENTS,
Chicago Univ., Illinois. Dept. of Biology.
D. J. Chapman.
In: The Biology of Blue-Green Algae, p 162-185. University of California Press, Berkeley and Los Angeles, 1973. 4 fig, 4 tab.

Descriptors: *Pigments, *Proteins, *Cyanophyta, Biochemistry, Amino acids, Synthesis, Rhodophyta, Cytological studies, Phylogeny, Algae.
Identifiers: *Biliproteins, *Bile pigments, Biosynthesis, Chemical structure.

Biliproteins are the red and blue bile pigment-protein conjugates of the blue-green, red and cryptomonad algae. They consist of non-cyclic tetrapyrrolic bile pigments covalently bound to a protein. The designation bilin or bile pigment is used as the generic name for the tetrapyrrolic chromophore. Thirteen biliproteins are currently known as distinct in vivo entities. Biliproteins usually represent 1-10% of the cell dry weight, although under certain circumstances it may be as much as 24%. Molecular weight, amino acid composition, and aggregation are discussed. It is established that the chromophores are bilins. The structure of in vitro chromophore, the in vivo chromophore and bilin-protein linkage, and billin-protein ratio are given. Evidence suggests there are two distinct chromophore-protein environments that are functionally very important. Phycobilisomes appear to have their own characteristic form. At the molecular level it has been generally accepted that bile pigments in plants and animals are derived by a common pathway and that such a pathway involves the formation and oxidative cleavage of a porphyrin. Results, indicating identity of a complex protein from a prokaryotic and eukaryotic source, are extremely interesting from the viewpoint of the symbiotic theory of chloroplast origin. (See also W74-12562) (Jones-Wisconsin)
W74-12570

STRUCTURE AND FUNCTION OF NUCLEIC ACIDS,
Imperial Chemical Industries Ltd., Runcorn (England). Corporate Lab., and Liverpool Univ. (England). Dept. of Biochemistry.
C. K. Leach, and M. Herdman.
In: The Biology of Blue-Green Algae, p 186-200. University of California Press, Berkeley and Los Angeles, 1973. 1 fig, 3 tab.

Descriptors: *Biochemistry, *Structure, *Organic acids, Cyanophyta, Chemical properties, Cytological studies, Synthesis, Mode of action, Algae.
Identifiers: *Nucleic acids, DNA, RNA, Chloroplasts.

The fine structure, chemical composition and biochemistry of the nucleic acids of blue-green algae are discussed and similarities between these and bacteria nucleic acids and of chloroplasts are compared. Ultrastructural investigations showed their distinction from nuclei of eukaryotes. The nuclear region of Anabaena cylindrica contained fibrils 5 to 7 nm diameter embedded in a matrix of lower electron density. The fibrils were assumed to be DNA by analogy with bacteria and comparison with stained nuclear areas. The base compositions of DNA from a group of organisms form one criterion by which the group can be classified. Blue-green algae possess mechanisms for maintenance and repair of DNA and appear to resemble other organisms in possessing two systems, one involving photoreactivation and the other dark repair. This maintenance of DNA, coupled with adequate control of DNA synthesis and accurate segregation of replicated DNA, ensures continuation of species as distinct groups free from major mutagenic changes. The process of ribosome formation and the regulation of their synthesis in the blue-green algae remain unstudied. Their distribution, size, and RNA composition are described. Transcription of DNA into RNA, translation, and nuclease activities are presented. (See also W74-12562) (Jones-Wisconsin)
W74-12571

MUTAGENESIS AND GENETIC RECOMBINATION,
Texas Univ., Port Aransas. Inst. of Marine Science.
C. Van Baalen.
In: The Biology of Blue-Green Algae, p 201-213. University of California Press, Berkeley and Los Angeles, 1973. 1 fig, 3 tab.

Descriptors: Algae, *Cytological studies, *Genetics, *Cyanophyta, Photoreactivation.
Identifiers: *Mutagenesis, *Recombination, Mutagenic agents.

The extent to which the nature of the chemical change in DNA leads to mutation, the possible selectivity of certain agents in causing only a limited spectrum of mutant isolates, and repair processes are operating in blue-green algae and influence the induction and recovery of mutants is only speculative. Much basic information on characterization of suspected mutant forms derived from a parent strain rests upon measurement of growth response changes. The spectrum of proven mutagenic agents is, in comparison with other organisms, limited. Alkylating agents have been used in attempts to produce mutant strains of blue-green algae. Ultraviolet radiation has also been observed to cause mutation. Types of mutants discussed are: antibiotic and drug resistant mutants, morphological mutants, nitrate assimilation mutants, pigment mutants, auxotrophs, mutants with altered ultraviolet light sensitivity, and others. Concerning repair processes, enzyme catalyzed photoreactivation, that is, restoration of biological activity by longer wavelengths than those causing the inactivation has been found. There are only a few observations that may be considered indicative of dark repair. Very little information is available concerning the arrangement of the genetic material. Results suggest that genetic exchange occurs in blue-green algae. (See also W74-12562) (Jones-Wisconsin)
W74-12572

PHYCOVIRUSES,
Environmental Protection Agency, Cincinnati, Ohio. Virology Section.
R. S. Safferman.
In: The Biology of Blue-Green Algae, p 214-237. University of California Press, Berkeley and Los Angeles, 1973. 7 fig, 2 tab.

Descriptors: *Viruses, *Cyanophyta, Systematics, Biocontrol, Algae.
Identifiers: *Phycoviruses, Algal viruses.

Attention has been focused on degree of control that phycoviruses may exercise over behavioral patterns of algae. Many morphological and chemical similarities are evident between viruses infecting bacteria and blue-green algae. A system of nomenclature stressing host specificity as its basic criterion was adopted for the algal viruses. Those algal viruses specifically infecting the Cyanophyta are classified under the common name blue-green algal virus (BGAV). Isolation of the LPP-1 virus led to the first serious attempt to use disease-causing agents in controlling algal populations. Apart from their algicidal application, it has been suggested that BGA viruses be used for assessing the efficiency of enteric virus removal in waste treatment processes. LPP-1 viruses are discussed under properties of the virus and its hosts, occurrence and distribution, effects of physical and chemical agents on the virus, characteristics of the viral nucleic acid and protein, replication cycle of the virus, interaction of radiations with the virus-host system, and the viral DNA replication. LPP-2 viruses, SM-1 virus, N-1 and AS-1 viruses, miscellaneous BGA viruses, and temperate BGA viruses are considered. (See also W74-12562) (Jones-Wisconsin)
W74-12573

THE HETEROCYST,
Westfield Coll., London (England). Dept. of Botany.
P. Fay.
In: The Biology of Blue-Green Algae, p 238-259. University of California Press, Berkeley and Los Angeles, 1973. 7 fig, 2 tab.

Descriptors: *Cytological studies, *Cyanophyta, Plant morphology, Structure, Nitrogen fixation, Plant physiology, Biochemistry, Algae.
Identifiers: *Heterocysts.

Characteristic features of heterocysts are rounded shape and relatively large size, partial separation from the neighboring vegetative cells by constriction, presence of conspicuous, thick surrounding envelope except at polar region, seemingly homogeneous cell content due to absence of cytoplasmic granular inclusions, presence near the attachment to the vegetative cell of strongly refractive structures called 'polar nodules', or 'polar thickenings', and a rather yellowish-green appearance. Heterocysts are produced during active growth of the blue-green alga. There is an indication of involvement of heterocysts in nitrogen fixation yet it neither necessitates nor excludes the assumption that nitrogenase is present in the vegetative cells. Some relationship between heterocysts and spores is characteristic of many blue-green algae. In Anabaena species heterocysts are frequently flanked by spores, and sporulation normally progresses from here from one vegetative cell to another. A theory that heterocysts function as storage organs was rejected as no storage products could be demonstrated. The latest hypothesis that heterocysts are involved in nitrogen fixation and may be the actual sites of effective nitrogenase activity provides a major metabolic role for these structures and is in accord with much of the knowledge of heterocyst occurrence and physiology. (See also W74-12562) (Jones-Wisconsin)
W74-12574

NITROGEN FIXATION,
Dundee Univ. (Scotland). Dept. of Biological Sciences.
W. D. P. Stewart.
In: The Biology of Blue-Green Algae, p 260-278. University of California Press, Berkeley and Los Angeles, 1973.

Descriptors: *Nitrogen fixation, *Cyanophyta, Plant physiology, Measurement, Cytological studies, Enzymes, Photosynthesis, Algae.
Identifiers: Nitrogenase activity, ATP.

There are more genera of blue-green algae known to fix nitrogen than there are of heterotrophic and photosynthetic bacteria combined. Heterocystous species are the most common forms of nitrogen-fixing algae. There is also evidence of nitrogen fixation by pure cultures of unicellular blue-green algae and by non-heterocystous filamentous algae. The requirements for in vitro nitrogenase activity are similar to those of nitrogenases from other plant groups in that a reductant and a source of ATP are essential. There are two main approaches to the elucidation of endogenous reductant sources in blue-green algae, one using cell-free ex-

tracts, and the other using whole cells. The specific function of ATP in the process is uncertain. Use of the acetylene reduction technique provides means whereby reductant and ATP requirements can be studied in short-term experiments without complications of a requirement for carbon skeletons to accept the fixed nitrogen. Blue-green algae are alone among nitrogen-fixing organisms in that they evolve oxygen during photosynthesis. It is proposed on the basis of these findings that in heterocystous algae, in air, perhaps an active nitrogenase occurs only in the heterocysts but that under anaerobic conditions both heterocysts and vegetative cells have an active enzyme. (See also W74-12562) (Jones-Wisconsin)
W74-12575

PHOTOMORPHOGENESIS AND NOSTOCACEAN DEVELOPMENT,
State Univ. of New York, Binghamton. Dept. of Biological Sciences.
N. Lazaroff.
In: The Biology of Blue-Green Algae, p 279-319. University of California Press, Berkeley and Los Angeles, 1973. 15 fig, 3 tab.

Descriptors: *Cyanophyta, *Cytological studies, *Nostoc, *Reproduction, Light, Evolution, Pigments, Life cycles, Plant morphology, Algae.
Identifiers: *Photomorphogenesis, Development stages, Polymorphism, Pleomorphism, Hormogonia, Heterocysts.

The work which established present basis for classification of heterocystous organisms mentioned nostocacean polymorphism and referred to possible influence of the natural environment on the succession of forms observed. Pleomorphic phenomena were frequently noted as responses to imposed alternations of physical and chemical environments of developing pure cultures. Dark growth and photoinduction and photoreversal of development are described. Some hypothetical models for photocontrol of development and pigment synthesis in cyanophycean cells are presented under spectral dependence, pigment synthesis, and developmental control. The release of hormogonia is affected by endogenous factors produced by growing thalli as well as by incident light quality. As a consequence of prolonged filamentous growth, cultures containing glucose display a woolly amorphous macrostructure, termed the 'lanose' macromorphology. The factors which influence direction of hormogonial migration, or the formation of motile aggregates of Nostocaceae trichomes are not understood. Light requirements and effects of inhibitors on migration of hormogonia are discussed. The factors controlling development of the Nostocaceae operate on a basic cycle of morphological change. Prolongation of a particular stage can result in variations of morphology within that stage following an alteration in some intrinsic interaction. (See also W74-12562) (Jones-Wisconsin)
W74-12576

MOVEMENTS,
Oregon Univ., Eugene. Dept. of Biology.
R. W. Castenholz.
In: The Biology of Blue-Green Algae, p 320-339. University of California Press, Berkeley and Los Angeles, 1973. 5 fig.

Descriptors: *Movement, *Cyanophyta, Light intensity, Light quality, Velocity, Environmental effects, Algae.
Identifiers: Gliding behavior, Motility mechanism, Oriented movements, Phototaxis.

Motility in blue-green algae is by gliding. Relatively slow gliding progress is accompanied in some species by rotation of the trichome along its axis. Any point on the trichome will trace either a right-handed or left-handed helix, species specific and noninterchangeable. Gliding velocity is dependent on numerous environmental factors including light intensity, light quality, temperature, pH, and medium viscosity. Availability of phosphate bond energy is the most immediate determinant. Utilization rate of ATP in gliding, as in other enzymatic processes, is temperature dependent. Full motility is immediately light dependent in some species of cyanophytes but coupled almost completely to respiratory energy production in others (Oscillatoria princeps). The current proposal for Oscillatoria is that numerous microfibrils strung uninterrupted in helices around exterior portion of trichome are the propulsive organelles which move the cell chain against an elastic sheath or other suitable substrate by rapid succession of unidirectional waves. Phototaxis is the only tactic response that has received much attention. Phototopotaxis is orientation and movement toward or away from incident light. Photo-phobotaxis is reversal of movement direction following a sudden change from high to low light intensity or vice versa. (See also W74-12562) (Jones-Wisconsin)
W74-12577

GAS VACUOLES,
Westfield Coll., London (England). Dept. of Botany.
A. E. Walsby.
In: The Biology of Blue-Green Algae, p 340-352. University of California Press, Berkeley and Los Angeles, 1973. 3 fig.

Descriptors: *Cytological studies, Cyanophyta, Structure, Mode of action, Algae.
Identifiers: *Gas vacuoles, Fine structure, Buoyancy.

Electron microscopy showed that gas vacuoles of blue-green algae are made up of stacks of membranous, hollow subunits. These gas vesicles retain their characteristic cylindrical appearance when they are isolated from algal cells is not subjected to pressure to cause their collapse. Metal shadowing and negative staining of isolated gas vesicles both reveal that the outer surfaces of the cylindrical structures have a striated topography. Chemical analyses have confirmed the proposition suggested by electron microscopy, that the gas vesicle membrane is fundamentally different from typical unit membranes. Chemical analysis of high purity preparations has demonstrated that protein is the major, and probably the only component. It has been postulated that gas vesicles might have arisen from over-production of protein by ancestral viral infections. The pressure of gas inside the vacuoles is usually at about one atmosphere, much lower than would exist in bubbles of a comparable size. By estimating the percentage area occupied by gas vesicles in thin sections of Anabaena flos-aquae cells, it was established that the gas vacuole content increased as cultures aged. Of the three functions that gas vacuoles might fulfil, that of storing gas is no longer tenable. The two other functions provide light shielding and buoyancy. (See also W74-12562) (Jones-Wisconsin)
W74-12578

FRESHWATER PLANKTON,
Durham Univ. (England). Dept. of Botany.
B. A. Whitton.
In: The Biology of Blue-Green Algae, p 353-367. University of California Press, Berkeley and Los Angeles, 1973. 1 tab.

Descriptors: *Cyanophyta, *Freshwater, *Plankton, Eutrophication, Plant morphology, Plant physiology, Ecology, Nitrogen, Phosphorus, Anabaena, Reproduction, Algicides, Inhibition, Tropical regions, Temperate, Competition, Algae.
Identifiers: Aphanizomenon, Oscillatoria, Quinone.

Ecological literature on planktonic blue-green algae is concerned largely with only about twenty species, those which sometimes form populations dense enough to be termed 'waterblooms'. Of the features widespread among bloom-forming species, the most obvious shown by nearly all such blue-green algae is the possession of gas vacuoles. Sensitivity to toxic substances, for example 2,3-DNQ, is found among bloom-forming species. There is also evidence that blue-green algae capable of forming blooms are more sensitive to copper than many other blue-green species. In the presence of dense blue-green algae blooms, algae belonging to other phyla are usually present only in low densities; at the same time the blue-green algal components of the bloom usually consist of only a few species, often with one overwhelmingly dominant. One obvious factor which will lead to selection for particular species is the availability of combined nitrogen. There have also been observations which indicate differences in the ability of bloom-forming species to use different phosphorus sources and levels. Depth of the water, occurrence of planktonic forms, spore formation, effect of temperature are all considered. Studies on planktonic species in individual genera include Aphanizomenon, Anabaena and Oscillatoria. (See also W74-12562) (Jones-Wisconsin)
W74-12579

PHYSIOLOGY AND ECOLOGY OF MARINE BLUE-GREEN ALGAE,
University Coll. of North Wales, Bayer. Marine Science Lab.
G. E. Fogg.
In: The Biology of Blue-Green Algae, p 368-378. University of California Press, Berkeley and Los Angeles, 1973.

Descriptors: *Marine algae, *Distribution, *Cyanophyta, Plant physiology, Ecology, Littoral, Sands, Rocks, Shores, Salt marshes, Mangrove swamps, Plankton, Algae.

Marine representatives of Cyanophyceae have some distinct features, including their nitrogen-fixing activities. The littoral fringe is delineated below by upper barnacle limit and its upper part is characterized by lichens, Verrucaria and Lichina. Free-living blue-green algae, belonging predominantly to genera Calothrix, Phormidium, Gloeocapsa, Nodularia and Rivularia, occur as a black encrusting film on rocky shores. Sand which remains undisturbed sufficiently long develops a blue-green community. In salt marshes and mangrove swamps, many species are the same as found on rocky shores, e.g., Calothrix scopulorum, Rivularia atra, Lyngbya aestuarii, Hydrocoleum lyngbyaceum and Phormidium tenue. Calothrix confervicola and Symploca hydnoides are recorded between low water mark and 5 m below this level and Lyngbya majuscula down to 30 m below low tide level in the Ria de Arosa. The tendency of Cyanophyceae to become symbiotic is manifested in the sublittoral. The exacting requirements of sublittoral forms contrast with the tolerance to variations in salinity noted for intertidal blue-green algae and suggests the existence of ecologically selected strains. The blue-green algae appearing in the marine plankton belong mainly to the genera Oscillatoria, Trichodesmium, Pelagothrix, Haliarachne and Katagnymene. Nostoc and a Dactylococcopsis have been reported from deep water. (See also W74-12562) (Jones-Wisconsin)
W74-12580

ECOLOGY OF BLUE-GREEN ALGAE IN HOT SPRINGS,
Oregon Univ., Eugene. Dept. of Biology.
R. W. Castenholz.
In: The Biology of Blue-Green Algae, p 379-414, University of California Press, Berkeley and Los Angeles, 1973. 9 fig.

Descriptors: *Ecology, *Cyanophyta, *Hot springs, Oregon, Chemical properties, Temperature, Hydrogen ion concentration, Nitrogen fixation.
Identifiers: *Thermophilic blue-green algae, Yellowstone National Park, Synechococcus lividus,

Oscillatoris terebriformis, Mastigocladus, Thermal ecology, Algae.

The subject of thermal ecology as applied to cyanophytes raises the question of whether a thermal tendency in blue-green algae may be expected because of some basic feature of their prokaryote cells. Cyanophytes occur in almost every illuminated hot spring above a pH of 5 and below 74C in western North America or below 64C in much of the rest of the world, unless there are extreme concentrations of certain solutes. In the Oregon hot springs, the unusually high temperature minimum for Synechococcus mat development is probably determined by the other competitive cyanophyte at that temperature, Oscillatoria terebriformis. In the Yellowstone springs, most work on cyanophyte mats was concentrated on a few alkaline sodium, chlorine bicarbonate springs. Many Yellowstone hot springs mats have the ability to fix nitrogen. One of the unique features of thermal biosystems is that few, if any, identical assemblages of microorganisms can be found on a global scale even when the physicochemical environment appears similar. The distribution of Synechococcus lividus, of Oscillatoria terebriformis, and of Mastigocladus are given. Sulphide appears the most common of chemical variables in hot springs that influence species composition. (See also W74-12562) (Jones-Wisconsin)
W74-12581

INTERACTIONS WITH OTHER ORGANISMS,
Durham Univ. (England). Dept. of Botany.
B. A. Whitton.
In: The Biology of Blue-Green Algae, p 415-433, University of California Press, Berkeley and Los Angeles, 1973. 2 fig.

Descriptors: *Cyanophyta, *Bacteria, *Symbiosis, Protozoa, Fungi, Algae, Carbon dioxide, Viruses, Habitats, Myxobacteria, Algicides, Inhibition, Epiphytology, Infection, Parasitism, Hosts, Lichens, Mosses, Nitrogen fixation.
Identifiers: Prokaryotes, Eukaryotes, Photosynthetic organisms, Multicellular animals, Antagonistic effects, Lytic bacteria, Phycobionts.

Blue-green algae occurring in a wide range of habitats influence, or are influenced by the behavior of a wide range of other organisms. Only two aspects have been studied closely: the lytic effect of certain organisms, especially myxobacteria, and the possible importance of bacteria in raising the carbon dioxide level. That organisms from many different taxa have at times a marked influence on behavior of blue-green algal populations is clear, for instance, bacteria, protozoa, fungi and viruses have all been shown to destruct local planktonic populations. It is still impossible to evaluate the relative importance of the various antagonistic agents in nature. The problems are to what extent different agents are more important in different habitats, and to what extent are their antagonistic effects influenced by the physiological conditions of the algal population. The answers are of obvious significance in situations where it is desired either to increase or decrease algal growth. Of many examples known of marked interactions between blue-green algae and eukaryotic organisms--protozoa fungi, photosynthetic organisms and multicellular animals--are the wide range of symbiotic associations. (See also W74-12562) (Jones-Wisconsin)
W74-12582

THE RELATIONSHIP BETWEEN BLUE-GREEN ALGAE AND CARBONATE DEPOSITS,
Boston Univ., Mass. Dept. of Biology.
S. Golubic.
In: The Biology of Blue-Green Algae, p 434-472, University of California Press, Berkeley and Los Angeles, 1973. 19 fig.

Descriptors: *Cyanophyta, *Carbonates, *Sedimentology, *Aggradation, Calcium carbonate, Marine geology, Freshwater, Geologic history, Carbonate rocks, Sedimentary rocks, Travertine, Algae.
Identifiers: Concretions, Oncolites, Algal stromatolites, Algal mats.

The relationship between cyanophytes and carbonates has attracted scientific attention for a long time, both in the geological and biological sciences. Fossil sedimentary structures found in carbonate rocks have been attributed to the activity of cyanophytes. The critical factor in the equilibrium is the amount of dissolved gaseous carbon dioxide in the system which depends upon the partial pressure of carbon dioxide in the atmosphere above the solution. Once precipitated from solution, calcium carbonate can either crystallize directly and form a sediment in the immediate environment, or it can be transported to form sediment elsewhere. Hence the calcium carbonate found in the thalli of benthic cyanophytes does not necessarily come exclusively from their own biogenic precipitation. Carbonate encrustation and its use in cyanophyte taxonomy depends upon degree of variability of encrustation within a species under different environmental conditions, and degree of convergency between different species under encrusting conditions. Marine carbonate precipitation and sediment formation in the marine coastal environment are discussed. Fossil stromatolitic structures occur throughout the entire geological column from the early Precambrian to the Recent. The disintegration of carbonate substrates by algae and fungi are reported. (See also W74-12562) (Jones-Wisconsin)
W74-12583

STATUS OF CLASSICAL TAXONOMY,
Madras Univ. (India). Botany Lab.
T. V. Desikachary.
In: The Biology of Blue-Green Algae, p 473-481, University of California Press, Berkeley and Los Angeles, 1973.

Descriptors: *Cyanophyta, *Systematics, Evolution, Algae.
Identifiers: Chroococcales, Filamentous blue-green algae.

Phycological problems of blue-green algal classification are generated by the classical taxonomy of their 150 genera and about 1500 species. Two broad categories are easily distinguishable, the coccoid (Chroococcales) and the filamentous forms. The latter are characterized by short pieces of trichomes which serve as reproductive bodies, the hormogonia. Refinement of the classification of the filamentous forms has resulted in separation of two (or more) orders, Nostocales and Stigonematales. Two other groups, sometimes treated as separate orders, the Chamaesiphonales and the Dermocarpales, include forms which exhibit polarity. The Stigonematales, can be distinguished from the other hormogonalean members (Nostocales) by the occurrence of true branches and the heterotrichous habit. In the sequential arrangement of the orders and families two systems are known, one followed by those who believe in the progressive evolution of the blue-greens from Oscillatoria-like plants to Stigonema-like ones and the other by those who believe that the reverse has taken place in a retrogressive evolution. Almost all agree that the coccoid forms are primitive, and they are generally placed at the very beginning of the whole group. (See also W74-12562) (Jones-Wisconsin)
W74-12584

PROSPECTS FOR TAXONOMIC DEVELOPMENTS,
Ceskoslovenska Akademie Ved, Trebon. Inst. of Microbiology.
J. Komarek.
In: The Biology of Blue-Green Algae, p 482-486, University of California Press, Berkeley and Los Angeles, 1973.

Descriptors: *Systematics, *Cyanophyta, Mathematical studies, Plant morphology, Plant physiology, Algae.
Identifiers: Numerical taxonomy.

Potentialities for using numerical methods in helping to clarify the muddled situation in blue-green alga taxonomy is presented. Classical taxonomy, with its underlying evolutionary assumptions, uses the monothetic principle of classification, as all the characters of subordinate taxa must necessarily be included in the definition of a superior taxon. The procedures of numerical classification involve the polythetic formation of taxonomic groups, without any preliminary definition of the distinguishing features characterizing the superior taxon. The taxa are defined by means of sets of input characters. Results of this procedure do not necessarily substantially differ from those obtained by the traditional methods. Use of numerical taxonomy does not exclude the necessity for observing the Code of Botanical Nomenclature. Any modern taxonomic revision requires data of at least two different types (e.g. morphological and physiological) combined with several different methodological approaches. Numerical evaluation requires as comprehensive a set of characters as possible, in contrast to the traditional system, which usually cannot make efficient use of all the accumulated morphological data. Although numerical methods in revising blue-green algae classification are stressed, numerous systems should be tried on smaller taxonomic units. (See also W74-12562) (Jones-Wisconsin)
W74-12585

EVOLUTIONARY AND ECOLOGICAL ASPECTS OF THE CYANOPHYTES,
Wisconsin Univ., Madison. Dept. of Bacteriology.
T. D. Brock.
In: The Biology of Blue-Green Algae, p 487-500, University of California Press, Berkeley and Los Angeles, 1973. 9 fig.

Descriptors: *Evolution, *Ecology, *Cyanophyta, Stratigraphy, History, Pigments, Anaerobic conditions, Thermal springs, Nitrogen fixation, Hydrogen ion concentration, Algae.
Identifiers: *Identification.

The cyanophytes are members of the prokaryotic group which contain chlorophyll-a and a phycobilin and which evolve oxygen by photosynthesis. The distinction from eukaryotic algae is usually made on the basis of general lack of intracellular differentiation in cyanophytes. If the cyanophyte has a cell diameter greater than 2.0 micrometers it can usually be distinguished from other prokaryotes; the difficulty arises when their cell diameters are less than 1.0 micrometer. Certainly the cyanophytes were the first oxygen-producing photosynthetic organisms, and they were probably responsible for a marked increase in the atmospheric oxygen concentration during the Precambrian period. Some cyanophytes are able to grow anaerobically, a property not normally associated with eukaryotic algae. Cyanophytes are the exclusive oxygen-evolving photosynthetic organisms in thermal springs, and are the only group of oxygen-evolving photosynthetic organisms which fix nitrogen. Their gas vacuoles permit upward movement in the water column from lower depths. The ability to live anaerobically may be a property retained by this group since their initial evolution in the Precambrian, providing them with a selective advantage over eukaryotic algae in certain habitats. (See also W74-12562) (Jones-Wisconsin)
W74-12586

AUTOTROPHY AND HETEROTROPHY IN UNICELLULAR BLUE-GREEN ALGAE,
Institut Pasteur, Paris (France).
R. Y. Stanier.
In: The Biology of Blue-Green Algae, p 501-518, University of California Press, Berkeley and Los Angeles, 1973. 6 fig, 8 tab.

Descriptors: *Cyanophyta, *Metabolism, *Nutrient requirements, Enzymes, Biochemistry, Carbon, Algae.
Identifiers: *Autotrophy, *Heterotrophy, Photoheterotrophy, Chemoheterotrophy, Aphanocapsa 6714, Synechococcus 6301, Aphanocapsa 6308, Unicellular blue-green algae.

All blue-green algae examined use light as an energy source and carbon dioxide as a carbon source, their dominant nutritional mode being photoautotrophy. Like other autotrophs, blue-green algae can take up organic compounds. Probably all blue-green algae can perform a light-dependent assimilation of organic substrates, such as acetate and amino acids. Many blue-green algae appear to be obligate photographs; the range of organic compounds able to support growth of facultative chemoheterotrophs is remarkably narrow--confined to glucose, fructose and one or two disaccharides. Data strongly suggests that growth of facultatively heterotrophic strains in dark is much slower than growth in light implying that rate of ATP synthesis by non-photochemical means is always far less than the rate of ATP synthesis by photophosphorylation. The range of organic compounds that support dark growth is so narrow because the pentose phosphate pathway is the sole energy-yielding dissimilatory pathway. If some blue-green algae can grow with sugars in the dark, why cannot all members of the group do so. The barrier seems to lie in one (or both) of the steps required to convert exogenous glucose to glucose-6-phosphate, mediated by glucose permease and hexokinase. (See also W74-12562) (Jones-Wisconsin)
W74-12587

CULTURE COLLECTIONS. APPENDIX A,
Ceskoslovenska Akademie Ved, Trebon. Inst. of Microbiology.
J. Komarek.
In: The Biology of Blue-Green Algae, p 519-524, University of California Press, Berkeley and Los Angeles, 1973.

Descriptors: *Algae, *Cultures, *Laboratories, Foreign countries, Canada, United States, Cyanophyta.
Identifiers: *Culture collections.

Laboratories which maintain culture collections of algae in Canada, Czechoslovakia, the Federal Republic Germany, France, German Democratic Republic, Great Britain, India, Japan, Switzerland, United States, and the Soviet Union are listed. Details are given under each specific laboratory. Investigators are advised to carefully examine all cultures for contaminants, including non-listed species of blue-green algae. (See also W74-12562) (Auen-Wisconsin)
W74-12588

NOTES ON ISOLATION AND LABORATORY CULTURE. APPENDIX B,
Liverpool Univ. (England). Dept. of Biochemistry.
N. G. Carr, J. Komarek, and B. A. Whitton.
In: The Biology of Blue-Green Algae, p 525-530, University of California Press, Berkeley and Los Angeles, 1973. 4 tab.

Descriptors: *Algae, *Cultures, *Cyanophyta, Laboratory tests, Methodology.

A selection of experimental procedures known to be effective for the isolation and laboratory culture of blue-green algae is presented. Several techniques, some involving the specific resistance to agents toxic to many bacteria or fungi, are listed. The use of non-mutagenic antibiotics is increasing and cycloheximide (actidione) is of particular value in inhibiting many eukaryotic contaminants. Detailed descriptions of the effects of particular antibiotics are summarized. Many species may be conveniently maintained in liquid culture or on agar slopes of mineral salts, the latter often preferable. Blue-green algae, unlike many other prokaryotes, should not be maintained in a refrigerator. Exponential growth may be achieved for several algal species and the culture media employed for some are described. Blue-green algae are sometimes very fastidious and the use, for all media, of double-glass distilled water is recommended. (See also W74-12562) (Auen-Wisconsin)
W74-12589

CONTINUOUS CULTURE OF FILAMENTOUS BLUE-GREEN ALGAE. APPENDIX C,
Bhabha Atomic Research Centre, Bombay (India). Biology and Agriculture Div.
J. Thomas.
In: The Biology of Blue-Green Algae, p 531-535, University of California Press, Berkeley and Los Angeles, 1973. 4 fig.

Descriptors: *Algae, *Cyanophyta, *Cultures, Methodology, Laboratory tests, Analytical techniques.
Identifiers: *Continuous culture, Chemostat.

Details of the working and control of the chemostat which has been found to give satisfactory steady-state performance for filamentous photosynthetic microorganisms such as Anabaena are reported. Briefly, continuous culture entails growing the microorganism in submerged culture with continuous addition of the medium at a specified rate while simultaneously harvesting the microbial suspension at a similar rate thus keeping the culture volume constant. By changing the dilution rate, different rates of growth are obtained. Maintaining a given dilution rate will soon result in a steady-state culture with physiological characteristics typical of the prevailing growth rate. The limiting factor is usually light intensity in photosynthetic microorganisms because the mean effective light intensity on the cell or on unit biomass is directly related to the dilution rate. The chemostat offers the advantages that the suspension depth (and thus the volume of suspension) can be changed in steps of 5 cm and chemostatic overflow ensured at any of the depths. Temperature is controlled without the use of cumbersome water baths. The provision for unilateral light facilitates direct assessment of light energy utilization by comparing incident light at the base of the cylinder and transmitted light measured just above the suspension. (See also W74-12562) (Auen-Wisconsin)
W74-12590

MASS CULTIVATION OF ANACYSTIS NIDULANS. APPENDIX D,
Tuebingen Univ. (West Germany). Institut fur Chemische Pflanzenphysiologie.
F. Juttner.
In: The Biology of Blue-Green Algae, p 536-539, University of California Press, Berkeley and Los Angeles, 1973. 1 fig.

Descriptors: *Algae, *Cultures, *Cyanophyta, Cytological studies, Laboratory tests, Methodology.
Identifiers: *Mass culture, Anacystis nidulans.

A laboratory technique to produce a sufficient number of cells of Anacystis nidulans and the construction of a large-scale culture unit that can easily produce kilogram amounts of algae is described in detail. It is based on the principle for algae cultivation of an open air pilot plant. Only inert materials like borosilicate glass and PTFE were used to prevent a negative influence of solved material on the algal growth. Besides Anacystis a great number of other algae from different classes as well as photosynthetic bacteria could be successfully grown in this culture unit. (See also W74-12562) (Auen-Wisconsin)
W74-12591

EFFECTS OF TOXAPHENE CONTAMINATION ON ESTUARINE ECOLOGY,
Georgia Univ., Sapelo Island. Marine Inst.
R. J. Reimold, P. C. Adams, and C. J. Durant.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10408; $4.50 in paper copy, $2.25 in microfiche. Georgia Marine Science Center, Skidaway Island, Technical Report Series No 73-8, September 1973. 100 p, 19 fig, 34 tab, 9 ref.

Descriptors: *Water pollution effects, *Estuaries, *Ecology, Sampling, Salt marshes, Georgia, Aquatic plants, Sediments, Statistical methods, Aquatic animals, Chlorinated hydrocarbon pesticides, Systematics.
Identifiers: *Toxaphene, Diversity index, Duplin Estuary(Ga), Sapelo Island(Ga).

The stream effluent from a toxaphene manufacturing plant drained directly into a tidal stream adjacent to Sapelo Island, Georgia, had released significant toxaphene in its effluent for the past two decades so that a shellfish pesticide monitoring program detected high levels of toxaphene in shellfish ten miles downstream. Samples of fauna, flora, sediment, and water were analyzed for toxaphene content. The major study area was a salt marsh watershed on the southeastern coast of Georgia. Purpose of the research was to quantify potential effects of toxaphene effluent on the estuarine fauna and flora and monitor quantitative changes in the ecosystem that might be associated with a toxaphene pollution abatement program. Ecological comparisons based on species diversity indices were made between this contaminated system and a pristine area. Computations of species diversity indices were completed using an IBM 360-65 computer. As the toxaphene content in the plant effluent decreased during the three year study period, the toxaphene content of fauna, flora and sediments also decreased. Concurrent with this was a significant increase in species diversity of the Brunswick marsh area, especially Terry Creek. (Jones-Wisconsin)
W74-12592

ROLE OF ALGAL AND FUNGAL POLYSACCHARIDES IN THE FORMATION AND HYDROLYSIS OF LAKE SEDIMENTS,
Ohio State Univ., Columbus. Dept. of Microbiology.
V. Sangar, and P. R. Dugan.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-236 177, $3.25 in paper copy, $2.25 in microfiche. Ohio Water Resources Center Project Completion Report No 394X, September 1973. 37 p, 2 fig, 12 tab, 59 ref. OWRT A-024-OHIO(1).

Descriptors: *Organic compounds, *Hydrolysis, *Carbohydrates, *Lake sediments, Cyanophyta, Algae, Fungi, Eutrophication, Lake Erie, Nitrogen, Lipids.
Identifiers: *Polysaccharides, Anacystis nidulans, Alternaria tenuis, Smittium culisetae.

Evidence indicates that extracellular bacterial polymers contribute significantly to sedimentation, representing an oxygen demand. The role of non-bacterial microorganisms such as algae and fungi in producing extracellular polymer is discussed. Because of the potential significance during algal blooms in Lake Erie, studies were conducted to determine extent and composition of polysaccharides produced by Anacystis nidulans and to determine what nutritional factors might influence cell and polymer production. Cell walls of Smittium culisetae were isolated by mechanical means and a quantitative and qualitative study was made. Lipid composition of an Alternaria was also studied. The relative distribution of major lipid classes of Alternaria tenuis isolated from bottom muds of Lake Erie's western basin are also presented. Both Anacystis nidulans and Alternaria tenuis were cultured on various nitrogen sources to determine effects of nitrogen on growth. It is

likely that Anacystis, responsible for algal blooms produces soluble polysaccharides which diffuse into the water causing a greater organic enrichment than would be accounted for by many procedures used to measure primary productivity. Examination of Alternaria tenuis lipids showed that almost all the major classes of lipids were present in its mycelium. (Jones-Wisconsin)
W74-12656

BACTERIAL CONTROL OF AQUATIC ALGAE,
Ohio State Univ., Columbus. Dept. of Microbiology.
J. C. Burnham.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-236 185, $4.00 in paper copy, $2.25 in microfiche. Ohio Water Resources Center Project Completion Report No 414X, October 1973. 90 p, 16 fig, 1 tab, 6 plates, 92 ref.

Descriptors: *Algal control, *Bacteria, *Biocontrol, *Cyanophyta, Parasitism, Mode of action, Laboratory tests, Toxicity, Chemcontrol, Algae.
Identifiers: *Bdellovibrio bacteriovorus, Phormidium luridium, Cell lysis, Selenium.

Active bdellovibrio cultures as well as culture supernatants (cell free by centrifugation and filtration) were capable of breaking down Oscillatoria. The disintegration caused by the enzymatic secretions of the bdellovibrios is extensive, resulting in the loss of cytoplasmic cell contents and eventual cell wall dissolution. Four day old cultures of blue-green algae, Oscillatoria sp. or Phormidium luridum, were interacted with 24 hr. cultures of Bdellovibrio bacteriovorus ATCC no. 15143 in both solid and liquid environments. Phase contrast microscopic examination showed gradual structural changes in both algae species until after 4 days only cell wall fragments remained. When photosynthesis was followed in the mixed culture of Bdellovibrio bacteriovorus and the bacterial-free Phormidium, a total inhibition of oxygen evolution occurred after 36 hours. The inhibition of photosynthesis will be the key to isolation and purification of the lytic factor. Experiments with lytic factor dilutions indicate that 1 bdellovibrio cell is producing enough of the factor to inhibit 75 P. luridium blue-green algae cells. Appendix II describes an improved method of cell enumeration for filamentous algae and bacteria and Appendix III discusses the toxic effects of selenium to blue-green algae. All laboratory tests and results are detailed. (Jones-Wisconsin)
W74-12657

THE BEHAVIOR OF PHOSPHATE IN THE INTERSTITIAL WATERS OF CHESAPEAKE BAY SEDIMENTS,
Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
J. T. Bray.
Available from the National Technical Information Service, Springfield, Va. 22161 as COO-3292-7, $10.50 in paper copy, $2.25 in microfiche. PhD thesis, 1973. 161 p, 28 fig, 13 tab, 114 ref. AEC AT(30-1)3497, AT(11-1)3292, NSF RANN GI-38973.

Descriptors: *Cycling nutrients, *Phosphates, *Connate water, *Chesapeake Bay, Sediments, Maryland, Iron, Mathematical models, Sediment-water interfaces, Analytical techniques, Distribution, Estuaries, Sampling.
Identifiers: Ferrous iron, Vivianite, Apatite.

Determinations of interstitial phosphate concentrations and a number of associated chemical paramenters were made on sediment cores taken along the axis of Chesapeake Bay. The phosphate analysis used is a measure of Soluble Reactive Phosphate, a method sensitive not only to inorganic orthophosphate, but also to some soluble organic phosphate forms and, so some extent, short-chain polyphosphates. These data were included into a simple equilibrium model. Results indicate that interstitial phosphate concentrations are covarient with the concentrations of dissolved ferrous iron and can be described by equilibrium between pore water and the mineral vivianite. This situation is contrary to the commonly accepted view that phosphate concentrations are controlled through equilibrium with the calcium phosphate minerals, especially the apatite group. Vivianite as a distinct sedimentary mineral phase was demonstrated by x-ray diffraction. The presence of vivianite lends additional support to the results of the equilibrium model. The interstitial waters of Chesapeake Bay sediments are a vast reservoir of dissolved inorganic phosphate. Estimates of diffusional flux into the overlying water indicate that the relative supply of phosphate to the biomass by this means may be of little significance. (Jones-Wisconsin)
W74-12658

A COMPARTMENTED AQUATIC MODEL OF THE RELATIONSHIP BETWEEN CARBONATE AND NITRATE IN A GREAT PLAINS RESERVOIR,
Oklahoma State Univ., Stillwater. Dept. of Chemistry; and Oklahoma State Univ., Stillwater. Dept. of Zoology; and Los Alamos Scientific Lab., N. M.
L. P. Varga, G. K. Rice, D. W. Toetz, and E. D. Loughran.
Available from the National Technical Information Service, Springfield, Va. 22161 as CONF-730445-1, $3.25 in paper copy, $2.25 in microfiche. Mimeo (undated). 22 p, 9 fig, 2 tab, 12 ref. AEC AT(11-1)-2070 AT(40-1)-4254.

Descriptors: *Mathematical models, *Nitrates, *Carbonates, *Eutrophication, *Algae, Reservoirs, Great Plains, Oklahoma, Cyanophyta, Cycling nutrients, Potable water, Actinomycetes, Solar radiation, Temperature, Light intensity, Ammonia, Oxygen, Carbon dioxide, Forecasting, Equations.
Identifiers: Lake Carl Blackwell(Okla).

Evidence is provided for the usefulness of a mathematical model in predicting annual bloom of blue-green algae in Lake Carl Blackwell, a water supply reservoir in Oklahoma. Some advances in the development of automated environmental sensors and a computational model for nitrate uptake are described. Size of the algal bloom may determine the population of actinomycetes which are generally blamed for musty odors in drinking water. A compartmented simulation model was developed in the form of a set of non-linear simultaneous differential equations. Input data used are diel and annual changes in irradiance, nitrate, ammonia, oxygen and carbon dioxide and annual changes in temperature. The maximum uptake rate of nitrate by phytoplankton as a function of light intensity was determined on August 14, 1970 by the N-15 isotopic dilution technique. The total inorganic carbon concentration was corrected for the carbonate tied up as complex ions assuming equilibrium at the surface. Predictions of the time course of the algal blooms made by the model are gratifyingly close to the observed wax and wane of algal populations, considering the limited data base. (Jones-Wisconsin)
W74-12659

CHESAPEAKE BAY NUTRIENT INPUT STUDY,
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.
V. Guide, and O. Villa, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-228 389, $10.00 in paper copy, $2.25 in microfiche. Technical Report 47, September 1972. 141 p, 30 fig, 28 tab, 28 ref.

Descriptors: *Eutrophication, *Chesapeake Bay, *Nutrients, Tributaries, Water quality, Watersheds(Basins), Potomac River, Rivers, Seasonal, Maryland, Surveys, Regression analysis.
Identifiers: *Nutrient loading, *Nutrient sources, Susquehanna River, Patuxent River, Rappahannock River, Mattaponi River, Pamunkey River, Chickahominy River, James River.

An intensive water quality survey of the Chesapeake Bay's major tributary watersheds was conducted to determine the primary sources and relative contribution of nutrients affecting the Chesapeake Bay from nontidal areas. The survey was confined to the following watersheds: Susquehanna, Patuxent, Potomac, Rappahannock, Mattaponi, Pamunkey, Chickahominy, and James. The primary sources of nutrients entering the Chesapeake Bay emanate from three major watersheds: Susquehanna, Potomac, and James. Control of nutrients from these major watersheds, especially the Susquehanna, should result in a restored nutrient balance in the Bay. Nutrient concentrations and river discharges showed interesting relationships which were found to be dependent on several factors, i.e., particular nutrient within a particular watershed, time of the year, and weather conditions which affected normal river discharge. Most of the water quality problems are similar to those in other comparable areas of the United States but are compounded because the area is largely tidal. Identification of the Susquehanna River as the major contributor to the Chesapeake Bay's nutrient load resulted in the implementation of an intensive nutrient survey within the Susquehanna Basin to locate individual sources and their degree of controllability. (Jones-Wisconsin)
W74-12660

AN ENVIRONMENTAL REFERENCE FOR THE CONSTRUCTION INDUSTRY,
Indiana Univ., Bloomington. Poplars Research and Conference Center.
P. Grills.
School of Public and Environmental Affairs Report, December 1974. 141 p.

Descriptors: *Environmental effects, *Pollution abatement, *Construction, *Industries, Legislation, Regulation, Economics, Bibliographies, Social aspects, Political aspects, Government finance, Grants, Construction materials, Indiana, Air pollution, Water pollution control, Standards, Permits.
Identifiers: *Construction industry, Construction sites.

Many construction operations are conducted on a project site. Usually the adverse effects of these operations can be minimized by assessing each operation for its potential effect on the natural environment, and taking the necessary precautions to prevent unwarranted damage. Federal and state statutes and regulations designed specifically for protection of the natural environment are discussed which deal only with the more salient features of the control scheme most directly affecting the construction industry. Statutory authority for regulatory powers, agencies responsible for administration, pertinent regulations, and the status and progress of future regulations are identified. The design and planning phase of construction must be familiar with the technology employed to meet environmental standards, environment impact statements, and necessary environmental permits and licenses. The impact of regulation will be determined by the industry's ability to adapt to its changing environment. Many of the more critical regulations, especially for control of runoff from construction sites are not yet promulgated. The industry should assist in developing these regulations by creating a good liaison with controling agencies. Educational programs could be developed. Possible sources for financial and program assistance are listed, and a bibliography is included. (Jones-Wisconsin)
W74-12661

LOST AND LIVING LAKES IN THE UPPER UME VALLEY,
G. Wassen.
Acta Phytogeographica Suecica, Vol 50, p 233-239, 1965. 5 fig.

Descriptors: *Lakes, *Vegetation, *Reservoirs, Shores, Alpine, Water level fluctuations, Algae, Aquatic plants.
Identifiers: *Sweden, *Ume River Valley(Sweden), Gardiken Reservoir(Sweden), Ajaure Lake(Sweden), Gautajaure Lake(Sweden), Lake Tarnasjon(Sweden), Lake Stora Umevattnet(Sweden).

The upper course of the Ume River, Sweden was studied, especially its shore vegetation. The woods around Lake Gardiken, a reservoir combining six lakes, are typical of the conifer forests of the prealpine subregion. The prevailing habitat conditions on the shores corresponded to the alpine environment. The most conspicuous zonation and richest in species was the Calluna belt. The adjacent Vaccinium vitis-idaea belt had a number of local preferential species. Through a gigantic dam was under construction in 1965, the two lakes, Ajaure and Gautajaure, will be combined. Drained through an eastern tributary, the remote lake, Tarnasjon, lies in an uninhabited area east of high-alpine summits with small glaciers. In the absence of Calluna, the part of the geolittoral corresponding to the Calluna belt is dominated by Nardus stricta, Cassiope hypnoides, and Vaccinium uliginosum. The source lake of the main river, Lake Stora Umevattnet, was unique for multiplicity in edaphical conditions and floristic richness, notable in cryptograms. Damming this lake in 1965 is one of the great sacrifices forced upon nature by technical development. (Jones-Wisconsin)
W74-12662

EFFECTS OF A SULPHATE PULP MILL ON THE BENTHIC MACROFAUNA IN A FIRTH OF THE BOTHNIAN SEA,
Swedish Water and Air Pollution Research Lab., Stockholm.
R. Rosenberg, K. Nilsson, and L. Landner.
To be published in 'Merentutkimuslait. Julk./Havsforskningsinst. Skr, Finland.' January 1974. 11 p, 7 fig, 2 tab, 14 ref.

Descriptors: *Water pollution effects, *Benthic fauna, *Estuaries, *Sulfates, Pulp wastes, Brackish water, Mercury, Dominant organisms, Distribution, Clams, Amphipoda, Oligochaetes, Diptera, Crustaceans.
Identifiers: *Natrafjarden Firth(Bothnia Sea), Sweden, Finland, Pontoporeia affinis, Macoma baltica, Mesidothea entomon.

Study was made of the effect of waste water from a sulphate pulp mill at Kopmanholmen, Sweden on the Natrafjarden Firth on the Gulf of Bothnia on benthic macrofauna. Physical and chemical parameters were determined. The organic wastes were transported in the surface water and oxygen depletion was not observed during the investigative period 1969-72. In August 1972 a total number of 32 stations were sampled in Natrafjarden and one station outside that area. Depths at these stations were between 5 and 57 m and more than 15,000 specimens were collected. No macrofauna was found at the 12 innermost stations of Natrafjarden due to heavy pollution. Four communities were distinguished with respect to depth and pollution. The most frequently found species were Pontoporeia affinis, Macoma baltica and Mesidothea entomon; the latter two were most tolerant to pollution. Faunal comparisons with other polluted areas are discussed. The highest diversity and biomass were found in shallow areas above 20 m in Natrafjarden and off the SW coast of Finland. In contrast, the highest diversity and biomass are generally found at greater depths in more saline waters. (Jones-Wisconsin)
W74-12663

PHYTOPLANKTON: GRASS OF THE SEA,
Oregon State Univ., Newport. Dept. of Oceanography.
H. Curl, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10454, $3.00 in paper copy, $2.25 in microfiche. Marine Advisory Program Sea Grant No. 9, December 1973. 4 p, 6 fig, 5 ref.

Descriptors: *Marine algae, *Food chains, Fish, Phytoplankton, Diatoms, Dinoflagellates, Cyanophyta, Productivity, Water pollution effects.

A murky green or amber appearance in nearshore coastal waters is almost always due to the presence of many small, single-celled plants called phytoplankton. From carbon dioxide and water, by photosynthesis, they produce more organic matter than any other plants and they release amounts of oxygen proportional to the carbon dioxide they use. Without this production, not only would there not be any food for grazing and filter feeding animals in the ocean but there would be no fish, which feed on the smaller grazers. On most westward-facing coastlines in all parts of the world, massive phytoplankton growths, called blooms, occur. Plants comprising phytoplankton are of many different species, all microscopic in size. Usually the most abundant are diatoms. The second most abundant organisms are dinoflagellates. Nearly all of the phytoplankton species are used as food by small invertebrate animals that feed by filtering the water. The total amount of marine food produced depends on the annual rate of production of phytoplankton, the type of organisms we can economically harvest and find edible, and on the number of steps in between. (Jones-Wisconsin)
W74-12664

ALGAE FROM LAKES IN NORTHERN COLORADO,
Vaxtbiologiska Institutionen, Uppsala (Sweden).
K. Thomasson.
Svensk Botanisk Tidskrift, Vol 58, No 1, p 73-80, 1964. 1 fig, 1 tab, 16 ref.

Descriptors: *Systematics, *Algae, *Lakes, *Colorado, Plankton, Benthos, Diatoms, Nutrients, Bottom sediments, Detritus, Chemical properties, Physical properties.
Identifiers: Carter Lake(Colo), Redrock Lake(Colo), Brainard Lake(Colo), Long Lake(Colo), Lake Isabelle(Colo), Desmids, Mountain lakes.

These notes are based on five plankton samples, one from each of five lakes. Carter Lake is an eight-year old artificial lake in Colorado, in the extensive Colorado-Big Thompson Water Conservation System. Redrock Lake is a semidrainage 'nitrogen-accumulator'. Brainard Lake is an artificial lake made in 1892 by damming a creek. Long Lake, one of the larger natural lakes of the area, is located in a U-shaped valley. Lake Isabelle is a typical mountain tarn, with the Continental Divide in the immediate background. Summing up results from these random samples, the plankton of Carter Lake is entirely different from that of the mountain lakes, and is characterized by predominance of Fragilaria crotonensis and Asterionella formosa. Among the planktic desmids only Staurastrum longipes and S. planctonicum occur in significant quantities. On the other hand, desmids are numerous in the samples from the mountain lakes, even if the benthic taxa are not considered. In the four mountain lakes the population of planktic diatoms is markedly lower than in Carter Lake. Lake Isabelle, at the highest elevation, has the poorest plankton, the shortest growing season, lowest summer maximum temperatures, and lowest supply of nutrients due to its small drainage area. (Jones-Wisconsin)
W74-12666

THE MAJOR RIVERS OF NORTHERN SWEDEN,
N. Quennerstedt.
Acta Phytogeographica Suecica, Vol 50, p 198-204, 1965. 3 fig.

Descriptors: *Rivers, *Aquatic plants, *Distribution, Vegetation, Algae, Lichens, Diatoms, Water level fluctuations, Cyanophyta, Chlorophyta, Rhodophyta, Turbulent flow.
Identifiers: *Sweden, Torne River(Sweden), Kalix River(Sweden), Pite River(Sweden).

Of the twelve large northern Sweden's main rivers, only three have not been changed by hydroelectric development. These are the Torne, the Kalix, and the Pite rivers. Vascular vegetation, inhabiting finer sediments and especially the mud bottoms of slack-water reaches, mostly consists of long-shoot plants, such as Potamogeton gramineus, P. perfoliatus and Myriophyllum alterniflorum; Sparganium is usually present and S. angustifolium, probably the most common species, together with its hybrid with S. Friesii are recognized in several rivers. Isoetids are frequently found and Isoetes lacustris is usually predominant. In the large main rivers, reeds--Phragmites--occur sporadically and likewise Scirpus lacustris, none of these existing in large colonies. Equisetum fluviatile, on the other hand, grows abundantly, particularly on the fine-grained riverbeds. One species of macro-algae, Nitella opaca, is fairly common in the main rivers. The algae occurring at the different seasons especially at flood time and the following dry seasons are listed. It would seem that the Torne River shows a greater differentiation in the total range of vegetation than most of the other north Swedish rivers, and vegetation of a distinct eutrophic trend is sometimes encountered. (Jones-Wisconsin)
W74-12668

STUDIES ON PHYTOPLANKTON PIGMENTS IN PORTO NOVO WATERS (INDIA). II. BACKWATER,
Marine Biological Station, Porto Novo (India).
K. Krishnamurthy, and V. Sundararaj.
Journal of Experimental Marine Biology and Ecology, Vol 14, No 3, p 285-294, 1974. 6 fig, 1 tab, 17 ref.

Descriptors: *Phytoplankton, *Pigments, Backwater, Chlorophyll, Seasonal, Neritic.
Identifiers: *Porto Novo(India), Bay of Bengal, Carotenoids, Phaeopigments, Noctiluca, Coscinodiscus, Thalassiothrix, Biddulphia, Hemidiscus, Melosira, Rhizosolenia.

The Backwater in Porto Novo, India waters exposes areas of very fertile mudflats which contain mostly sedentary and semi-sedentary organisms. Rich and fertile oyster beds are dominant formations. The fresh water flow in the system is largely through rivulets, irrigation channels, and seasonal freshwater discharges through the Vellar Estuary. The annual cycle of phytoplankton pigments and characteristics of their distribution are presented. Chlorophyll-a varied from 2.91-65.56 micrograms/l, chlorophyll-b from 0-1.90 micrograms/l, chlorophyll-c from 0-38.60 micrograms/l, plant carotenoids from 0.30-22.34 MSPU/cu m, and phaeopigments from 0-31.51 micrograms/l. Primary maximum of chlorphyll-a appeared during June at Stations 3-5 and during May at Station 6. Stations 3 and 4 had secondary chlorophyll-a maxima during September and Stations 5 and 6 during August. In general, all the stations showed an increasing trend of chlorophyll-a values before the main peak. The chlorophyll maximum was mainly due to the presence of phytoplankton species belonging to the genera Noctiluca, Coscinodiscus, Thalassiothrix, Biddulphia, Hemidiscus, Melosira and Rhizosolenia. Chlorophyll-a concentration was normally affected by rainfall. (Jones-Wisconsin)
W74-12669

DIATOMS IN THE LAKE VEGETATION OF THE LANGAN DRAINAGE AREA, JAMTLAND, SWEDEN (DIATOMEERNAILANGANS SJOVEGETATION),
Vaxtbiologiska Institutionen, Uppsala (Sweden).
N. Quennerstedt.
Acta Phytogeographica Suecica, Vol 36. 208 p, 39 fig, 15 tab, 370 ref. English summary.

Descriptors: *Diatoms, *Lakes, *Vegetation, Water level fluctuation, Plankton, Benthos, Geology, Fish, Aquatic plants, Mosses, Crustaceans, Rotifers, Phytoplankton, Cyanophyta, Watersheds(Basins), Systematics, Physical properties, Chemical properties, Alpine, Algae, Geologic history.
Identifiers: *Sweden, Jamtland(Sweden), Mountain lakes, Langan River(Sweden).

Biological investigations in the Langan district of western Jamtland, Sweden were undertaken to preserve a record of the plant and animal life existing in a mountain lake system destined for water storage purposes. These investigations have chiefly been directed towards the vegetation with emphasis on the diatoms which are catalogued. The physical and chemical characteristics of the lakes and the topography, geology, climate of the Langan drainage area are given. Of the Langan lakes, Ovre Oldsjon has been studied best. The vascular plant vegetation is characterized most by isoetides predominated by Isoetes lacustris. A characteristic of the lake's vegetation are submersed mosses. In general, Crustacea and Rotifera are predominate in the plankton; the phytoplankton is quantitatively small. The dominant benthic algal vegetation is composed of Cyanophyceae and diatoms. Vertical sections of sediment in southern Ovre Oldsjon were taken and a relative chronology was evolved with the aid of pollen diagrams. The postglacial history of Ovre Oldsjon shows the trend is toward a lower trophic standard, a meiotrophication. (Jones-Wisconsin)
W74-12670

LAKE VATTERN. OUTLINES OF ITS NATURAL HISTORY, ESPECIALLY ITS VEGETATION,
Uppsala Univ. (Sweden). Inst. for Plant Ecology.
N. Salberg.
Acta Phytogeographica Suecica, Vol. XI, 1939. 60 p, 1 fig, 8 plates, 74 ref.

Descriptors: *Lakes, *Vegetation, Geologic history, Temperature, Algae, Aquatic plants, Chara, Hydrography, Chemical properties, Algae, Zooplankton, Physical properties.
Identifiers: *Lake Vattern(Sweden), Transparency.

A survey is presented of Lake Vattern, Sweden, a lake especially interesting because of its clarity, its great depth, stormy character, and the play of colors in its waters. Records go back to 1664. Its 1900 square kilometers fill a fault in the earth's crust, and it has an alternately lacustrine and marine postglacial history. The higher vegetation and algae descend deeply into the lake. Nitella opaca was lowered to depths varying from 4-20 m. The percentage of oxygen was constant at a depth of about 10 m. When a continuous southerly wind prevails there accumulates in northern Vattern a relatively homothermal layer of warm epilimnetic water, the thickness of which sometimes reaches the bottom. Then the southern parts are cooled and they have 'bottom temperature'; when the wind is from the north, the opposite is true. Chemical analyses were made. The algae from the southern part near Jonkoping collected in July-August 1898, are reprinted. Common plankton species are listed. Phytogeographical distribution and some phytogeographically interesting species, the vascular vegetation of southern, middle and northern Vattern, flora and vegetation of Characeae, and flora and vegetation of epilithic algae are all given. (Jones-Wisconsin)
W74-12671

SALT MARSH VEGETATION IN SOUTHERN SWEDEN,
V. Gillner.
Acta Phytogeographica Suecica, Vol 50, p 97-104, 1965. 3 fig, 15 ref.

Descriptors: *Salt marshes, *Vegetation, Salinity, Brackish water, Littoral, Shares, Aquatic plants.
Identifiers: *Sweden.

The Swedish salt marsh is rather narrowly defined to include only the plant life of the geolittoral zone. The terrestrial meadow immediately above and the hydrolittoral immediately below this belt are considered and briefly discussed as contact vegetation. First the salt marsh vegetation of the west coast is described and compared with the salt marsh farther south, on the Oresund. The composition of brackish meadow vegetation along the east coast south of and within the Kalmarsund area is briefly touched upon. Further northwards the marshes become increasingly like freshwater ones, but some marine species occur all around the Gulf of Bothnia. A survey showed that the salt marsh vegetation is most varied at the west coast, where habitat conditions offer the widest range. In their most typical form the salt marshes of the west coast resemble those of the North Sea coast, though in a much smaller scale and with rather fewer species. Locally freshwater seepages may give rise to similarities with the brackish marshes of the Baltic. Each of the three areas described, the west coast, Oresund and the southern Baltic coast, has certain floristic peculiarities of its own. (Jones-Wisconsin)
W74-12672

NOTES ON ALGAL VEGETATION OF LAKE KARIBA,
Vaxtbiologiska Institutionen, Uppsala (Sweden).
K. Thomasson.
Nova Acta Regiae Societatis Scientiarum Upsaliensis, Ser IV, Vol 19, No 1, p 3-34, 1965. 13 fig, 2 tab, 107 ref.

Descriptors: *Algae, *Tropical regions, *Systematics, Plankton, Diatoms, Lakes, Water analysis, Thermal stratification, Aquatic life.
Identifiers: *Lake Kariba(Rhodesia), Salvinia auriculata.

The algae and other aquatic life of tropical Lake Kariba, located between Zambia and Northern Rhodesia, is described. The lake's surface temperature varies between 23 and 29C. Physical measurements and results of chemical analyses are given. The main stress was laid on desmids but members of other groups were studied to some extent and a few notes on animals are included. Only a few diatoms are listed. The most imposing feature was the explosive growth of Salvinia auriculata, which covered more than 23,000 ha of the lake surface by the end of 1959 and more than 67,000 ha in early 1960. The character of the algal flora is unmistakably tropical. Plankter and tychoplankter distribution is given and is compared with their occurrence in Lake Bangweulu in northern Zambia. Some taxonomical comments, with illustrations, are made on about 70 algae and animals. (Jones-Wisconsin)
W74-12673

WATER QUALITY CRITERIA 1972, A REPORT OF THE COMMITTEE ON WATER QUALITY CRITERIA.
National Academy of Sciences-National Academy of Engineering, Washington, D.C. Environmental Studies Board.
For primary bibliographic entry see Field 5G.
W74-12674

RESEARCH NEEDS IN WATER QUALITY CRITERIA, 1972.
National Academy of Sciences-National Academy of Engineering, Washington, D.C. Environmental Studies Board.
For primary bibliographic entry see Field 5G.
W74-12675

ENVIRONMENTAL POLLUTION BY FLUORINE WITH RESPECT TO THE PROSPECTIVE ALUMINUM FACTORIES IN KYUSHU, JAPAN (IN JAPANESE),
Kagoshima Univ. (Japan). Dept. of Chemistry.
T. Onishi.
Sci Rep Kagoshima Univ. 21, p 45-55. 1972. Illus.

Descriptors: *Aluminum, Environment, Industrial plants, *Fluorine, *Water pollution sources, Air pollution.
Identifiers: Japan, Kyushu.

In view of the aluminum electrolyte smelting factories planned to be established in the area, distribution and sources of fluorine in Kyushu, Japan, were studied. Fluorine levels in the rain, air, volcanoes and rivers were studied. The area was a highly fluorine-polluted area. Effects of fluorine on humans and plants were also studied. Such fluorine-related symptoms as excessive bone growths, liver and kidney disorders and spotted teeth in humans have not yet been reported in the area. Measures should be taken against possible effects of fluorine before the establishment of the factories.--Copyright 1973, Biological Abstracts, Inc.
W74-12680

LEPTOSPIROSIS: AN EPIDEMIC IN CHILDREN,
Center for Disease Control, Atlanta, Ga. Epidemiology Program.
R. M. Barkin, and J. W. Glosser.
Am J Epidemiol. Vol 98, No 3, p 184-191. 1973. Illus.

Descriptors: *Water pollution effects, *Diseases, *Human diseases, *Animal diseases, Domestic animals, Public health, *Epidemics storm runoff, *Texas.
Identifiers: Children, Dogs, Leptospira-canicola, *Leptospirosis, Texas.

Leptospirosis (7 cases) caused by serotype (Leptospira) canicola occurred in Baytown, Texas, in the summer of 1971. The 1st case was in a 1.5-yr-old child who became ill on July 4. The subsequent cases occurred between Aug. 12 and 15 in children 4 - 15 yr of age. All the children were members of a large family living in a trailer camp. The children had similar symptoms. All cases were serologically confirmed, and leptospires were isolated from urines of 3 children. The family's pet dogs were also infected with (L) canicola. Isolates from the children and the dogs were identical to (L) canicola Hond Utrecht. The infected children and dogs played in pools of water caused by heavy rains. Direct and indirect transmission of leptospires probably occurred in this epidemic.--Copyright 1974, Biological Abstracts, Inc.
W74-12685

AZOTOBACTER CHROOCOCCUM IN THE PHYLLOSPHERE OF WATER HYACINTH (EICHHORNIA CRASSIPES MERT. SOLMS),
Indian Agricultural Research Inst., New Delhi. Div. of Microbiology.
For primary bibliographic entry see Field 2I.
W74-12686

BIOGEOCHEMISTRY OF THE RARE-EARTH ELEMENTS IN AQUATIC MACROPHYTES OF LINSLEY POND, NORTH BRANDFORD, CONNECTICUT,
Pittsburgh Univ., Pa. Dept. of Biology.
For primary bibliographic entry see Field 5A.
W74-12687

VEGETATIONAL ZONATION IN TWO SUCCESSIONAL BRACKISH MARSHES OF THE CHESAPEAKE BAY,
Duke Univ., Durham, N.C. Dept. of Botany.
M. G. Flowers.
Chesapeake Sci. Vol 14, No 3, p 197-200. 1973. Illus.

Descriptors: *Maryland, Aquatic life, Aquatic plants, Wetlands, *Salt marshes, Marsh plants, Brackish water, *Chesapeake Bay, *Vegetation.
Identifiers: Depth, Height, Marshes, Salinity, Scirpus-olneyi, Scirpus-robustus, Spartina-alterniflora, Typha-angustifolia, Soil depth, Tidal heights.

Vascular plant zonation and successional stages were studied in 2 brackish marshes of Calvert County, Maryland. One marsh is mature and stable, while the other is undergoing rapid succession from a former lake bottom. Soil depth, water salinity, and tidal heights were measured. Transect surveys show a general zonation of Spartina alterniflora to Scirpus olneyi to upland vegetation in the stable marsh and a Spartina alterniflora to Scirpus robustus to Typha angustifolia to upland vegetation succession in the developing marsh. Elevation of the marsh relative to mean high water is the most obvious factor influencing the plant distribution.--Copyright 1974, Biological Abstracts, Inc.
W74-12689

ECOLOGY AND PRODUCTION OF JUVENILE SPRING CHINOOK SALMON, ONCORHYNCHUS TSHAWYTSCHA, IN A EUTROPHIC RESERVOIR,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
D. L. Higley, and C. E. Bond.
U S Natl Mar Fish Serv Fish Bull. Vol 71, No 3, p 877-891. 1973. Illus.

Descriptors: Fish, Aquatic life, Juvenile fish, Fry, Fish stocking, Fish hatcheries, Fish genetics, Fish reproduction, Salmon, Toxins, Fish toxins, Salmonids, *Oregon, *Chinook salmon.
Identifiers: Chaoborid, Entomostraca, Oncorhynchus-kisutch, Oncorhynchus-tshawytscha, Reservoirs, Juvenile salmon, Rearing sites.

Juvenile spring chinook salmon, Oncorhynchus tshawytscha, were reared in a central Oregon reservoir of 7.5 ha. The reservoir is strongly eutrophic, as shown by its heavy sedimentation, summer stratification and chemical qualities (total dissolved solids over 200 ppm, total P to 0.4 ppm and summer pH between 9 and 10). Surface water temperatures ranged from 3-29 degrees C. Salmon were apparently confined to the upper 3 m during the summer because of low dissolved oxygen below this depth. In 1961, epilimnion conditions of high pH, high temperatures, decreasing oxygen concentrations and possibly algal toxins caused condition loss and deaths among salmon. Fry planted in 1961 (75,300) and in 1962 (150,000) suffered 1st-summer mortalities in excess of 80%, primarily due to predation by older salmon. Summer growth was rapid, but dependent on population densities. Coho salmon, O. kisutch and chinook salmon remaining from a 1959 plant averaged 280 and 215 g after 3 mo. The 1961 year class averaged 62 g at 10 mo. and 89 g at 22 mo. The 1962 year class averaged 22 g at 9 mo. Average condition factor values rose above 1.20 in the summer. Net production by the 1961 year class was 159 kg/ha in 1962. The 1962 year class produced 170 kg/ha in 1962. Potential Dec. yield of 1st-yr salmon was 98 kg/ha in 1961 and 73.5 kg/ha in 1962. First-year salmon are primarily Entomostraca and chaborid larvae. Apparently competition from the 1962 year class caused the 1961 year class to feed more on littoral and terrestrial forms and to grow and produce less in their 2nd year. Age class I and age class II salmon weighing from 25-189 g emigrated via spillway outflows. In 1963, migrations occurred only at temperatures above 10 degrees C; this relationship was not observed in 1962. This reservoir, or others with similar limnological conditions, cannot be recommended as a rearing site for chinook salmon because of the severe summer conditions.--Copyright 1974, Biological Abstracts, Inc.
W74-12692

COXSACKIEVIRUS B EPIDEMIC AT A BOYS' SUMMER CAMP: ISOLATION OF VIRUS FROM SWIMMING WATER,
Vermont Univ., Burlington.
For primary bibliographic entry see Field 5A.
W74-12698

PRIMARY PHYTOPLANKTON PRODUCTIVITY IN THE EASTERN MURMAN BAYS, (IN RUSSIAN),
Murmanskii Morskoi Biologicheskii Institut (USSR).
A. A. Solov' eva.
Gidrobiol Zh. Vol 9, No 4, p 14-19. Illus. 1973. English summary.
Identifiers: Bays, Chaetoceros-compressus, Chaetoceros-subsecundus, *Chlorophyll, Diatoms, Eastern, Flagellates, Fragilaria-oceanica, Murman, Nitzschia-seriata, *Phytoplankton, *Primary productivity, Russian-SFSR: Salinity, Skeletonema-costatum, Thalassiosira-nordenskioldii, *USSR(East Murman bays), *Eutrophication.

Qualitative and quantitative phytoplankton composition, the chlorophyll content, and organic substances appearance in the superficial layer of 2 East Murman Bays (Russian SFSR, USSR) are considered. Two peaks are pointed out in the phytoplankton development, depending on 2 essential algae groups: diatoms (Fragilaria oceanica, Thalassiosira nordenskioldii, Chaetocerus compressus, C. subsecundus, Skeletonema costatum, Nitzschia seriata), and diatoms and small flagellates. The late summer peak in one of the bays is a result of freshening of the water. Dependence was found between phytoplankton productivity, chlorophyll a content and the phytoplankton cell number.--Copyright 1974, Biological Abstracts, Inc.
W74-12703

ECTOPARASITIC INFUSORIA OF STICKLEBACK FROM THE NEVA DELTA, USSR, (IN RUSSIAN),
For primary bibliographic entry see Field 2L.
W74-12706

SPECIES AND QUANTITATIVE CONTENT OF THE PLANKTON AND BENTHOS OF THE AGGEL' LAKE, (IN RUSSIAN),
For primary bibliographic entry see Field 2H.
W74-12708

NUTRIENT ENRICHMENT OF NATURAL WATERS,
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-12709

THE RELATIONSHIP OF BACTERIA AND BLUE-GREEN ALGAE, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. of Microbiology.
L. E. Mikhailenko, and I. Ya. Kulikova.
Gidrobiol Zh. Vol 9, No 2, p 52-59. 1973. Illus.
Identifiers: Algae, Aphanizomenon, *Bacteria, Microcystis, Plankton, *Cyanophyta, Eutrophication.

The number of total bacteria and saprophytic bacteria in the Kiev and Kremenchug Reservoirs (USSR) reached peaks in the spring and the summer-fall period. The 1st increase was associated with the presence of large amounts of allochthonous microflora, the 2nd with favorable temperatures and the massive 'blooming' of phytoplankton which released many biogenic substances. Bacterial development was directly linked to phytoplankton content and the amount of organic matter. The bacteria count in the seston was determined in surface layers associated with blooming of Microcystis and in some cases Aphanizomenon. The amount of bacterial biomass increased with aging and dying of the algae. The number of saprophytic bacteria mineralizing proteins was counted in the range of millions and tens of millions of cells/g of seston. The values were much higher than those obtained for soil from these waters. The data indicate that Microcystis and Aphanizomenon at all stages of development are good substrates for bacteria and contradict theories on the bactericidal effect of algae.--Copyright 1974, Biological Abstracts, Inc.
W74-12710

REASONS FOR CRITICISM OF THE SYSTEM OF SAPROBIONTS,
Polskie Towarzystwo Przyrodnikow im Kopernika, Warsaw.
For primary bibliographic entry see Field 5B.
W74-12711

A CONTRIBUTION TO THE ECOLOGICAL STUDY OF THE BOU REGREG ESTUARY: THE PROBLEM OF POLLUTION,
Institut Scientifique Cherifien, Rabat (Morocco). Lab. of Zoology.
B. Elkaim.
Bull Soc Sci Nat Phys Maroc. 51, p 203-212. 1971. Illus.
Identifiers: *Morocco(Bou-Regreg estuary), Estuaries, *Biochemical oxygen demand, *Dissolved oxygen, Water pollution effects.

The BOD (biological O2 demand) and DO (dissolved O2) values are given for 5 stations over a 5 yr period. Pollution is increasing, as is evidenced by the proliferation of a certain species favored by pollution with the elimination of other species affected by this pollution.--Copyright 1974, Biological Abstracts, Inc.
W74-12712

MERCURY IN AQUATIC BIRDS AT CLAY LAKE, WESTERN ONTARIO,
Canadian Wildlife Service, Edmonton (Alberta).
K. Vermeer, F. A. J. Armstrong, and D. R. M. Hatch.
J Wildl Manage. Vol 37, No 1, p 58-61. 1973.
Identifiers: *Canada(Clay Lake), *Mercury, *Toxicity, Birds, Clay Lake, *Water birds.

Total Hg levels ranging from 2-16 ppm in eggs did not appear to affect the hatching and fledging of herring gulls (Larus argentatus). Hg levels in breast muscles of 5 American widgeons (Mareca americana), 16 mallards (Anas platyrhynchos), 17 blue-winged teals (Anas discors), 21 common goldeneyes (Bucephala clangula), 17 common mergansers (Mergus merganser) and 7 hooded mergansers (Lophodytes cucullatus) averaged 0.5, 6.1, 6.5, 7.8, 6.8, and 12.3 ppm respectively at Clay Lake (Ontario, Canada) 4-6 wk prior to the hunting season in 1971. Methyl Hg in 5 ducks ranged from 69 - 99% of total Hg. Crayfish (Orconectes virilis) muscle contained the highest Hg levels of food items found in esophagi and stomachs of ducks. The high values in breast muscles of hooded mergansers are likely related to their feeding on crayfish.--Copyright 1974, Biological Abstracts, Inc.
W74-12717

HELMINTHS OF SOCKEYE SALMON (ONCORHYNCHUS NERKA) FROM THE KVICHAK RIVER SYSTEM, BRISTOL BAY, ALASKA,
Battelle-Pacific Northwest Labs., Richland, Wash. Ecosystems Dept.

D. A. Pennell, C. D. Becker, and N. R. Scofield.
US Natl Mar Fish Serv Fish Bull. Vol 71, No 1, p 267-277. 1973. Illus.

Descriptors: *Salmon *Sockeye salmon, Juvenile fish, *Alaska, United States, Smolt, Freshwater fish, *Diseases.
Identifiers: Anisakis, Bolbosoma-caenoforme, Brachyphallus-crenatus, Contracaecum, Diphyllobothrium, Diplostomulum, Echinorhynchus-gadi, Eubothrium-salvelini, Gyrodactyloides-strelkowi, Helminths, Lecithaster-gibbosus, Neoechinorhynchus-rutili, Oncorhynchus-nerka, Philonema-oncorhynchi, Phyllobothrium-caudatum, Proteocephalus, Rhabdochona, Triaenophorus-crassus, Tubulovesicula-lindbergi, Kvichak River, *Bristol Bay(Alas).

A study of helminths infecting juvenile and adult sockeye salmon (O. nerka) leaving and entering the Kvichak River system, Bristol Bay, Alaska (USA) was conducted in 1969. Ten helminths acquired in fresh water were found in smolts: Diplostomulum sp.; an unidentified trematode; Diphyllobothrium spp.; Triaenophorus crassus Forel, 1868; Proteocephalus sp.; Eubothrium salvelini (Schrank, 1790); Neoechinorhynchus rutili (Mueller, 1789); Philonema oncorhynchi Kuitunen-Ekbaum, 1933; Rhabdochona sp.; and Contracaecum sp. In addition to surviving larval stages of freshwater parasites, adults were infected by 9 helminths acquired in the sea: Gyrodactyloides strelkowi Bykhovskaya and Polyanskaya, 1953; Lecithaster gibbosus (Rud., 1802); Brachyphallus crenatus (Rud., 1802); Tubulovesicula lindbergi (Layman, 1930); Phyllobothrium caudatum (Zschokke and Heitz, 1914); Echinorhynchus gadi Mueller, 1776; Bolbosoma caenoforme Heitz, 1920; Anisakis sp.; and Contracaecum sp. Infection incidences and intensities are tabulated where accurate data are available. Information on life histories is assembled from scattered sources, and some ecological aspects of helminths infecting Kvichak sockeye salmon are briefly discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-12719

CLASSIFICATION AND COMMUNITY STRUCTURE OF MACROBENTHOS IN THE HAMPTON ROADS AREA, VIRGINIA,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5A.
W74-12727

STUDIES ON THE ANEMIA OF FISH: V. DIETARY IRON DEFICIENT ANEMIA IN BROOK TROUT, SALVELINUS FONTINALIS,
Freshwater Fisheries Research Lab., Tokyo (Japan).
H. Kawatsu.
Bull Freshwater Fish Res Lab. Vol 22, No 1, p 59-67. 1972. Illus.
Identifiers: *Anemia(Fish), Salvelinus-Fontinalis, *Fish disease, Brook trout, Fish diets.

Hematological observation was made on the brook trout fed on a synthetic diet in which Fe was excluded from mineral supplements. The anemia induced by dietary iron deficiency was characteristic of the hypochromic microcytic anemia. The decrease rate of Hb was larger than the red blood cell count and hematocrit. The latent period was found before the MCHC (mean corpuscular concentration) drastically decreased. In the recovery test, the MCHC reached the initial level within 3 wk and the MCV (mean corpuscular volume) within 6 wk. The percentage of immature erythrocytes did not decrease under the conditions of Fe deficiency. Regarding the leukocytes, no recognizable changes were observed in relation to Fe deficiency.--Copyright 1973, Biological Abstracts, Inc.
W74-12736

ON THE LITTORAL ALGAE OF THE LAKE NUUKSION PITKAJARVI, SOUTHERN FINLAND: I. ECOLOGY OF THE MOST IMPORTANT ALGAL SPECIES,
Helsinki Univ. (Finland). Dept. of Limnology.
T. Tikkanen.
Ann Bot Fenn. Vol 9, No 3, p 117-125. 1972. (English summary).
Identifiers: *Algae, *Finland(Lake Nuuksion), Pitkajarvi, Lakes, Water pollution effects.

The composition and occurrence of the littoral algal flora of a relatively oligotrophic southern Finnish lake are described. The environmental factors considered are fluctuations in the water level, shore type, depth, solar radiation and the quality of the substrate. The 43 most important taxa are presented.--Copyright 1973, Biological Abstracts, Inc.
W74-12738

STUDIES ON GILL PARASITOSIS OF THE GRASSCARP (CTENOPHARYNGODON-IDELLA) CAUSED BY DACTYLOGYRUS LAMELLATUS ACHMEROV, 1952: IV. HISTOLOGICAL CHANGES,
K. Molnar.
Acta Vet Acad Sci Hung. Vol 22, No 1, p 9-24. 1972. Illus.
Identifiers: *Carp, Ctenopharyngodon, Dactylogyrus, Necorsis, Parsitosis, *Fish parasites, *Grasscarp.

Gills of healthy grasscarps (C. idella) and specimens infected with D. lamellatus were examined. The anatomical and histological structure of normal branchial lamellae is described to aid diagnostic comparison. Establishment of D. lamellatus parasites on the gill lamellae gives rise to local and general lesions. The local lesions comprise erosions, endothelial impairment and minor areas of cell degeneration around the site of attachment of the parasite. The general gill lesions include degeneration, tissue damage, hemorrhages, necrosis, atrophy and cell proliferation. The nature of the lesions depends on the duration of the disease, the number of parasites established on the gill and the extent of regeneration. If the infection takes a rapid course, the typical lesion is degeneration of the respiratory plate epithelium. In acute dactylogyrosis this is compensated by proliferation of the cuboidal cells of the lamellar epithelium which results in the disappearance of respiratory plates, process-like transformation and adhesion of the lamellae. If the condition is chronic, the respiratory epithelium becomes damaged, the epithelium atrophies and the lamellae necrotize but there is only a local degeneration.--Copyright 1973, Biological Abstracts, Inc.
W74-12740

EFFECT OF ARSENIC-CONTAINING MINERAL WATERS ON TISSUE RESPIRATION FOLLOWING INTERNAL AND EXTERNAL USE, (IN RUSSIAN),
Z. I. Semenovich.
Vopr Kurortol Fizioter Lech Fiz Kul't. Vol 36, No 6, p 538-541. 1971.
Identifiers: *Arsenic, *Rats, *Respiration, Tissue.

The As-containing mineral water of the Sinegorsk deposit, USSR, when taken internally for 7 days caused a decrease in O2 consumption by 40% in rat liver and by 27% in kidney; when taken for 14 days it decreased by 31 and 36%, respectively. After a course of baths in As-containing water the O2 consumption by liver tissue decreased 44%, and by the kidney tissue, 41%. One month after completing the course of baths a decrease of O2 consumption by liver tissue (by 30%) was still noted.--Copyright 1973, Biological Abstracts, Inc.
W74-12745

LONG-TERM CHANGES IN THE PARASITIC FAUNA OF SOME FISH IN THE DNIESTER BASIN, (IN RUSSIAN),
Zooveterynarnyi Instytut, Lvov (USSR).
For primary bibliographic entry see Field 2H.
W74-12746

PARASITES OF FISH FROM LAKE SAREZ (PAMIRS), (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
M. Ashurova.
Parazitologiya. 7(2): 164-168. 1973. (Engl summ).
Identifiers: Pamirs, Schizopygopsis, *USSR(Lake Sarey), Lakes, *Fish parasites.

The parasite fauna of Schizothorax intermedius and Schizopygopsis stoliczkai from Lake Sarez (the central part of Pamirs USSR) and its peculiarities in connection with ecological conditions of hosts' habitats are described.--Copyright 1973, Biological Abstracts, Inc.
W74-12750

5D. Waste Treatment Processes

METABOLISM OF COMPONENTS OF EXTENDED AERATION ACTIVATED SLUDGE,
Oklahoma State Univ., Stillwater. School of Civil Engineering.
A. F. Gaudy, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 636, $5.00 in paper copy, $2.25 in microfiche. Oklahoma Water Resources Institute, Stillwater, Completion Report, (1974). 172 p, 6 append. OWRT A-035-OKLA(3) 14-31-0001-4036.

Descriptors: *Waste water treatment, *Aeration, Microbial degradation, Oxidation, *Hydrolysis, *Activated sludge, *Biological treatment, *Metabolism, Microorganisms, Cytological studies, Pilot plants.
Identifiers: *Extended aeration.

The use of biological cells and/or their individual cell components as substrates by other microorganisms was investigated. The utilization of microorganisms as substrates concurrently with performance of their functions as substrate users is the basic concept upon which the extended aeration or total oxidation process is based. This aspect was investigated directly by growing, in pure culture, cells which produced copious amounts of extracellular polysaccharide, harvesting polysaccharide and feeding it as sole source of carbon to heterogeneous microbial populations of sewage origin. After a period of acclimation, heterogeneous microbial populations could be developed which metabolized this extracellular polysaccharide material very rapidly. Long-term pilot plant studies were undertaken in which the 'hydrolytic assist' to an extended aeration process was examined. The 'hydrolytic assist' involves withdrawing some cells and performing chemical hydrolysis in order to solubilize some of the macromolecules. This portion of the sludge is then recycled as essentially liquified sludge along with intact cells. Long-term plant experiments were run to determine if this mode of operation could provide for adequate control of biological solids concentration and permit the system to retain its nitrifying characteristics as well as high substrate removal capability. Such a process was indeed feasible. Aspects of cell maintenance were examined; model equations for biological solids concentration and effluent substrate concentration would be improved with respect to prediction of excess biological sludge or cell output by the inclusion of a term for cell maintenance.
W74-12001

COMPUTER MANAGEMENT OF A COMBINED SEWER SYSTEM,
Municipality of Metropolitan Seattle, Wash.

C. P. Leiser.
Copy available from GPO Sup Doc as EP1.23:670/2-74-022, $5.30; microfiche from NTIS, Springfield, Va 22161 as PB-235 717, PC$8.30, $2.25 microfiche. Environmental Protection Agency, Cincinnati, Ohio, Technology Series, Report EPA-670/2-74-022, July 1974. 474 p, 108 fig, 49 tab, 51 ref, 13 append. EPA Project 11022 ELK. Program Element 1BB034/ROAP 21-ASZ/TASK 37.

Descriptors: *Computer programs, *Flow control, *Overflow, *Combined sewers, *Operating costs, *Remote control, *Computer models, Flow measurement, Mathematical models, Storm runoff, Runoff, Water pollution, *Waste water treatment, Sampling, Storage tanks, Telemetry, Monitors, Construction, Maintenance, *Washington.
Identifiers: *Flow regulators, Computer control, In-sewer storage, *Seattle(Wash), Systems management, Systems control.

At the conclusion of a ten-year construction program which affected much of Seattle's combined sewer system, a computer-controlled 'total systems management' complex was proposed, funded and constructed. Computer augmented treatment and disposal (CATAD) takes advantage of storage in the sewers to limit overflows, and selects overflow points based on water quality data. Since the control system began operating in 1971, receiving water quality, especially dissolved oxygen and coliform levels, has shown significant improvement; overflow volume has decreased by 50 to 60 percent during supervisory control and in excess of 90 percent during three months of limited automatic control. Eight pollution loading parameters were measured and found to be 68 percent less than before advanced control techniques. Capital costs totaled $2.6 million for the control system at the 36 remote stations, or $5.3 million, including construction of 15 gate-driven regulator stations. Annual maintenance and operation costs totaled $270,000. The system is worth roughly $40 to $245 million in equivalent sewer separation. Work continues on a fully automatic optimizing model to add predicative capability to program decisions so the system could maintain an 80 percent overflow reduction. (See also W72-08984) (EPA)
W74-12003

HIGH-RATE LAND TREATMENT I: INFILTRATION AND HYDRAULIC ASPECTS OF THE FLUSHING MEADOWS PROJECT,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
H. Bouwer, R. C. Rice, and E. D. Escarcega.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 834-843, May 1974. 3 fig, 5 tab, 11 ref.

Descriptors: *Infiltration rates, *Flooding, Basins, Effluents, Irrigation, Recreation, *Water reuse, Hydraulics, Aquifers, Groundwater, Flow, Sewage effluents, *Tertiary treatment, *Arizona.
Identifiers: High-rate infiltration, Flushing Meadows Project, Phoenix(Ariz).

An experimental high-rate land treatment system, the Flushing Meadows project, was initiated to study renovation of secondary sewage effluent for irrigation, recreation, and some industrial uses. The project attempted renovation through high-rate infiltration basins in the bed of the Salt River. It was found that infiltration rates decreased linearly during flooding and were restored sigmoidally during drying of the basins. One acre of basin area could renovate 0.36 mgd of effluent due to a hydraulic loading of 400 feet per year obtained by 20 to 30-day flooding periods alternated with 10-day drying periods in summer and 20-day drying periods in winter. The bottom condition most desirable for high infiltration rates was mature grass stand, followed by bare soil and then gravel. A deep, nonvegetated basin is thought to be most condusive to high infiltration rates. A uniform, anisotrophic aquifer was assumed and showed good agreement with horizontal and vertical hydraulic conductivities obtained by a resistance netowork analog from groundwater level response to recharge and those obtained by well tests. The existence of active and passive flow regions was inferred by the effective transmissibility for recharge of twelve percent of the transmissibility for the entire saturated height of the unconfined aquifer. The hydraulic conductivity of the aquifer was not noticably affected by groundwater recharge with sewage effluent. (See also W74-12005) (Murphy-FIRL)
W74-12004

HIGH-RATE LAND TREATMENT II: WATER QUALITY AND ECONOMIC ASPECTS OF THE FLUSHING MEADOWS PROJECT,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
H. Bouwer, J. C. Lance, and M. S. Riggs.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 844-859, May 1974. 9 fig, 3 tab, 15 ref.

Descriptors: *Water quality, *Costs, *Filtration, *Secondary treatment, Suspended solids, *Arizona, *Water reuse, Biochemical oxygen demand, Coliforms, Flooding, Nitrogen, Recycling, Recreation, Irrigation, Water reuse, Ammonium, Tertiary treatment, Hydrogen ion concentration.
Identifiers: *Hydraulic loading, Organic carbon, *Phoenix(Ariz).

Water quality and economic aspects of the Flushing Meadows project in Phoenix, Arizona, were investigated. The filtration of the secondary effluent through the gravel and sand resulted in almost complete removal of SS, BOD, and fecal coliforms, but total organic carbon was still present in concentrations of about five mg/liter. No fecal coliforms were encountered after 300 feet of horizontal travel. Total nitrogen load at the design hydraulic loading rate of 300 feet per year was 24,000 pounds per acre. Cyclic flooding and drying periods of several days each yielded essentially complete conversion of the nitrogen in the effluent to nitrate in the renovated water, but no removal of nitrogen. With flooding and drying periods of two weeks each, ammonium was adsorbed in the soil during flooding and nitrified; it was partially denitrified during drying. This yielded a net nitrogen removal of about 30 percent, which could be doubled or almost tripled by addition of organic carbon, recycling part of the renovated water, or by reducing the hydraulic loading rate. Phosphate removal was about 50 percent after 30 feet of underground travel, as was fluoride. Copper and zinc concentrations were reduced by about 80 percent. Dissolved salts content of the renovated water was about two percent higher than that of the effluent. The pH was lowered from 8 to 7. It was concluded that high-quality renovated water suitable for unrestricted irrigation and recreation can be obtained. Cost was about $5.3/acre-foot which is significantly less than the cost of equivalent in-plant tertiary treatment required to produce a water of similar quality. (See also W74-12004) (Murphy-FIRL)
W74-12005

WHAT'S NEW IN WATER AND SEWER PIPE,
For primary bibliographic entry see Field 8A.
W74-12007

RPC DIVISION, MIDLAND-ROSS CORP. 10-GALLON-PER-MINUTE LIQUID/LIQUID SEPARATOR,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va. Fuels Handling Equipment Div.
For primary bibliographic entry see Field 5G.
W74-12009

A STUDY OF SELECTED COOLING POND DESIGN TECHNIQUES,
South Carolina Univ., Columbia. Coll. of Engineering.
J. H. Gibbons, and F. P. Pike.
Available from NTIS, Springfield, Va. 22161 as SRO-701-1, Price $5.45 printed copy; $2.25 microfiche. Contract Report SRO-701-1, June 1973. 74 p, 5 fig, 65 ref. AEC Contract AT(38-1)-701.

Descriptors: *Water pollution control, *Cooling water, *Hydraulic design, *Thermal pollution, Model studies, Reviews, Design, *Waste water treatment.
Identifiers: *Cooling reservoirs.

The available literature on cooling ponds was reviewed; the importance of the mixing problem is stressed. Seven visits were made to six electric utilities in the Southeast, exploring their information needs in regard to cooling reservoirs and their thermal rejection problems in general. In addition, visits were made to the Edison Electric Institute and to two consulting firms. Only a very few utilities engage in any intensive design of cooling ponds. It is clear that no generally accepted design procedures for cooling ponds are yet available. The key problem is the degree of mixing, which can be measured only with great difficulty. If the lake is completely mixed, or the flow through it is plug flow, design procedures are available. These two solutions bracket the case of the real reservoir, which is partially mixed. It is possible with a heat-conduction model to successfully model existing reservoirs for which sufficient data are available. The best answer is provided by hydraulic modeling. (Knapp-USGS)
W74-12015

ZONAL CENTRIFUGATION: APPLIED ASPECTS IN ELUCIDATING CHEMICAL AND BIOLOGICAL FORMS, DISTRIBUTION AND AVAILABILITY OF HEAVY METALS IN THE ENVIRONMENT,
Oak Ridge National Lab., Tenn.
J. N. Brantley, J. P. Breillatt, F. S. Brinkley, C. W. Francis, and B. A. Halsall.
In: ORNL-NSF-EATC-6, p 195-221, January 1974. 7 fig, 5 tab, 6 ref.

Descriptors: *Soil contamination, *Pollutant abatement, *Soil treatment, *Radioactivity, *Toxins, *Centrifugation, Analytical techniques, Instrumentation, Research and development, Laboratories, Absorption, Waste treatment.
Identifiers: *Zonal centrifugation.

One of the major objectives was to develop a large-scale zonal rotor capable of isopycnically banding soil and sediment particles in a nonaqueous density gradient. Zonal centrifugation has been shown to be a unique analytical tool for separating and identifying specific soil reaction products. Previous zonal work with soils and sediments was limited to swinging bucket rotors in which only 250 mg of sample could be banded in each bucket. Development of the large-scale zonal rotor will enable isopynic banding of 7 to 10 g of soil or sediment in one operation. Resolution in banding with the large-scale zonal rotor should also be enhanced. The increased capacity of the zonal rotor will allow more detailed characterization of each density band as well as providing sufficient material to evaluate the biological availability of a specific reaction product or adsorbed pollutant. (See also W74-12021) (Houser-ORNL)
W74-12026

RECOVERY OF TOXIC METALS FROM INDUSTRIAL EFFLUENT SOLUTIONS BY SOLVENT EXTRACTION,
Oak Ridge National Lab., Tenn.
F. L. Moore, W. S. Groenier, and W. E. Bayless.
In: ORNL-NSF-EATC-6, p 333-359, January 1974. 7 fig, 4 tab, 8 ref.

Descriptors: *Effluents, *Industrial wastes, *Abatement, Water pollution control, Toxicity, *Solvent extractions, Research and development, Zinc, Mercury, Cadmium, Pilot plants, Industrial plants, Brines, *Waste water treatment.
Identifiers: *Waste recovery.

Studies have continued on the applicability of the solvent extraction technique for pollution abatement of toxic metals in industrial effluents. Recent work on the extraction of inorganic mercury and organomercury compounds with quaternary amines is described, and studies of the extraction behavior of zinc and cadmium from aqueous cyanide solutions are discussed. Selected quaternary amines dissolved in diethylbenzene are considerably more effective than the pure diethylbenzene for the extraction of methylmercuric chloride and phenylmercuric acetate. The quaternary amines are the only extractants suitable for removing zinc and cadmium from cyanide solutions. A bench-scale mini-plant was designed and fabricated for operation with solvent extraction flowsheets for toxic metals removal. (See also W74-12021) (Houser-ORNL)
W74-12033

ELECTROCHEMICAL RECOVERY OF REDUCIBLE INORGANIC POLLUTANTS FROM AQUEOUS STREAMS,
Oak Ridge National Lab., Tenn.
F. A. Posey, and A. A. Palko.
In: ORNL-NSF-EATC-6, p 360-389, January 1974. 11 fig, 10 ref.

Descriptors: *Abatement, Water pollution control, Streams, *Inorganic compounds, Toxicity, *Metals, Lead, Copper, Cadmium, Electrodes, *Electrochemistry, Hydrogen ion concentration, Temperature, Industrial wastes, Effluents, Research and development, Laboratories, *Waste water treatment.

Results of continuing studies on the use of porous and packed-bed electrodes for electrolytic recovery of dissolved heavy metals from flowing streams are presented. Effects of solution composition, temperature, pH, and other factors on the rate of reduction of lead, copper, cadmium, and some other metals on a carbon substrate are discussed. Lead, copper, and cadmium could be reduced over a useful range of electrode potentials from all the solutions examined, so that efficient removal of these substances on porous and packed-bed electrodes is feasible. Experiments on the feasibility of electrolytic treatment of two lead-containing industrial effluents are presented. One effluent, a dilute rinse water from a continuous lead-lead oxide strip plating operation, could not be treated efficiently because of limited solution conductivity. The other effluent, from the manufacture of organolead compounds, was successfully treated electrolytically to remove dissolved inorganic and organic lead compounds from an organolead plant effluent under laboratory conditions. Progress in the development of prototype cells for lead recovery is discussed. (See also W74-12021) (Houser-ORNL)
W74-12034

EFFECTS OF RADIOACTIVE STRONTIUM ON MICROFLORA OF WATER AND ON MINERALIZATION PROCESSES OF ORGANIC SUBSTANCES,
V. M. Zhogova.
In: AEC-tr-7512, p 368-374, April 1974. 2 fig, 1 bibliography.

Descriptors: *Strontium, *Waste water treatment, *Water pollution treatment, *Aquatic environment, Environmental effects, Treatment facilities, Microbiology, Silts, Reservoirs, Sewage disposal, Degradation, Biodegradation, Biological treatment.
Identifiers: *Microflora.

Sanitary agencies and designing organizations are faced with problems related to treatment and decontamination of sewage water containing radioactive substances. One would expect that radioactive substances present in sewage water and accumulated in active silt will have a deleterious effect on the microfloral of biological treatment plants (biofilters, air tanks) thus lowering the efficiency of their operation. After reaching open reservoirs with liquid sewage, radioactive substances could have an adverse effect on survival of aquatic microflora and the mineralizing activity of water with reference to organic substances, thus deteriorating the sanitary condition of reservoirs. Radioactive strontium is among the most hazardous elements in this respect, since it can be incorporated in biological cycle and can accumulate in some animal tissues and biosubstances. (See also W74-12038) (Houser-ORNL)
W74-12041

STORAGE OF PLUTONIUM METAL IN SEALED CANS,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
L. E. Musgrave.
Available from NTIS, Springfield, Va 22161 as Rept No RFP-2143; $4/copy, $2.25/microfiche. Report No RFP-2143, March 15, 1974. 16 p, 15 fig, 5 tab, 8 ref.

Descriptors: *Radioactive waste disposal, *Plutonium, *Waste storage, *Safety, Stability, *Corrosion, Oxidation, Water, Moisture, Humidity, Chemical reaction, Fire, Research and development, Metallurgy, Materials engineering.
Identifiers: *Fire hazards.

Experiments have been conducted to assess the corrosion and fire hazards of plutonium metal stored in sealed produce cans. The amount of corrosion observed was about 10 times less than that expected in freely flowing air of 20 to 30% relative humidity. The reduction in corrosion is due to the reduced amount of oxidizer present in the sealed can; however, oxygen in air is not the chief oxidizer. Experiments with cans sealed in air and those sealed in low-oxygen atmospheres showed little difference in the amount of corrosion that later occurred. This suggests the main oxidizer is water vapor adsorbed inside the can. Experiments showed, however, that up to 40 g of molecular sieve was not effective in reducing the corrosion. Ignition experiments with corrosion products from unalloyed plutonium buttons showed that material to be combustible. In fact, when piled to sufficient depth on the button (about 1/8 in.), the corrosion product can burn when ignited by scratching the button. (Houser-ORNL)
W74-12046

WASTE PROCESSING IN THE CHEMICAL AND PETROCHEMICAL INDUSTRIES--A BIBLIOGRAPHY WITH ABSTRACTS,
National Technical Information Service, Springfield, Va.
E. J. Lehmann.
Available from NTIS, Springfield, Va 22161 as COM-73-11386, Price $20.00 printed copy; $2.25 microfiche. NTIS Publication NTIS-WIN-73-022, June 1973. 87 p.

Descriptors: *Bibliographies, *Waste treatment, Abstracts, *Chemical wastes, *Oil wastes, *Industrial wastes, *Waste water treatment.

This bibliography on industrial waste treatment contains 87 selected abstracts of research reports. The reports included discuss control processes, economic factors and abatement strategies for the chemical and petrochemical industries. (Knapp-USGS)
W74-12069

DOMESTIC WASH-WATER RECLAMATION USING AN AEROSPACE-DEVELOPED WATER RECOVERY SUBSYSTEM,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. B. Hall, Jr.
Available from NTIS, Springfield, Va 22161 as N73-31913, Price $3.00 printed copy; $2.25 microfiche. Technical Memorandum X-2896, September 1973. 24 p, 3 fig, 5 tab, 7 ref, 2 append.

Descriptors: *Water reuse, *Reclaimed water, *Distillation, *Waste water treatment, Water purification, Potable water.

A prototype distillation system for water recovery designed for aerospace use, was tested to determine its capability to recover potable water from domestic wash water. A total of 26.25 gallons of domestic wash water was processed over a 7-day period at an average process rate of 3.85 gallons per day. The subsystem produced water that met all United States Public Health Standards for drinking water. Average energy consumption was approximately 12.74 kilowatt-hours per gallon of water recovered. This condition represents a worst-case energy consumption since no attempt was made to recover heat energy in the subsystem. An ultraviolet radiation cell installed in the effluent line of the subsystem was effective in controlling coliforms within acceptable levels of drinking water. The subsystem recovered virtually 100% of the available water in the waste-water process. In addition, the subsystem removed 99.6% nd 98.3% of the surfactants and phosphate, respectively, from the wash water. (Knapp-USGS)
W74-12073

COAST GUARD 20 MAN SHIPBOARD WASTE-WATER TREATMENT SYSTEM--PHASE 1, FINAL REPORT,
Thiokol Chemical Corp., Brigham City, Utah. Wasatch Div.
T. J. O'Grady.
Available from NTIS, Springfield, Va 22161 as AD-764 558 Price $4.25 printed copy; $2.25 microfiche. Document No TWR-6231, Contract Report for Coast Guard Office of Research and Development, July 1972. 98 p, 32 fig, 15 tab. Coast Guard DOT-CG-12, 843-A.

Descriptors: *Waste treatment, *Waste water treatment, *Ships, *Sewage treatment, Water pollution control, Incineration, Waste disposal.

A shipboard waste treatment system for a crew of 10-20 was studied. A preliminary design for the prototype system is presented. The results of the laboratory model testing are analyzed and the alternative approaches compared for filter-incinerator and secondary treatment systems. The catalyzed electrolytic process provides rapid oxidation of dissolved organic material in the waste, producing an effluent low in BOD and suspended solids. (Knapp-USGS)
W74-12083

STUDY RELATING TO THE USE OF A PROCESS CONTROL COMPUTER FOR A WATER TREATMENT PLANT IN FRANCE,
Compagnie Generale des Eaux, Paris (France).
For primary bibliographic entry see Field 5F.
W74-12119

COMPUTER USE IN US WATER AUTHORITY,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 5F.
W74-12120

THE COMPUTER SIMULATION OF THE OPERATION OF A BANK OF RAPID GRAVITY FILTERS,
Water Research Association, Marlow (England).
D. W. Hilder.

In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 79-84, 25-27 September 1973. 5 fig, 2 ref.

Descriptors: *Computer programs, *Simulation analysis, Control, *Weirs, *Water quality control, *Waste water treatment, *Filters, Gravity, Water quantity, Effluents, Water delivery, Operations research, Valves, Systems analysis.
Identifiers: Filter plants, Influents, Backwashing.

A computer simulation program has been developed from a suitable mathematical model to represent the operation of a bank of rapid gravity filters. The mathematical model accounts for the flows into the filters, the transient storage in the filters, the relationships between the heads and flows through the filters, and the effects due to backwashing. Different methods of filter control and operation can be simulated. This paper deals with the application of the simulation to a bank of sixteen filters and investigates two methods of operation: (1) as fixed rate achieved by influent weir control; and (2) as a variable declining rate system. An idealized system is considered. Simulation results are discussed. It is concluded that the two systems are identical, except for the methods in which water is delivered to the bank of filters. Moreover, water balance calculations show that the amount of water delivered by the system is the same in both cases, and the simulation assumes that the influent water quality is the same. (See also W74-12107) (Bell-Cornell)
W74-12141

THE START-UP MODEL OF A RAPID SAND FILTER,
Philips Forschungslaboratorium G.m.b.H., Hamburg (West Germany).
For primary bibliographic entry see Field 5F.
W74-12146

SOME EXTENSION SERVICE CAPABILITIES,
Georgia Univ., Athens. Cooperative Extension Service.
For primary bibliographic entry see Field 6E.
W74-12172

INFORMAL OPINIONS,
Food and Drug Administration, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-12173

MICROBIOLOGICAL INHIBITION TESTING PROCEDURE,
Weston (Roy F.), Inc., West Chester, Pa.
For primary bibliographic entry see Field 5A.
W74-12189

EFFECT OF TEMPERATURE AND OXYGEN PRESSURE ON CELLULOSE UTILIZATION BY THERMOPHILIC ORGANISMS,
Rhode Island Univ., Kingston. Dept. of Chemical Engineering, and Rhode Island Univ., Kingston. Dept. of Microbiology.
S. M. Barnett, R. A. Romanelli, and C. W. Houston.
Available from the National Technical Information Service as PB-235 839 $4.50 in paper copy, $2.25 in microfiche. Completion Report, July 1974. 101p, 19 fig, 12 tab, 151 ref. OWRT A-046-RI(1), 14-31-001-3840.

Descriptors: Thermosphilic animals, *Fungi, *Cellulose, Dissolved oxygen, *Fermentation, Temperature, Pressure, *Waste water treatment, *Growth rate.
Identifiers: Thermophilic organisms, *Thermophilic fungi, *Chaetomium thermophil, *Sporotrichum thermophile, *Thermoascus aurantiacus.

Three thermophilic celluloytic fungi, Chaetomium thermophile var. coprophile, Sporotrichum thermophile and Thermoascus aurantiacus were studied to determine the conditions for a high rate of cellulose degradation. The range of temperature over which good growth occurred was determined first in a temperature gradient incubator, the optimum temperature was then established in shake flask cultures. T. aurantiacus had the highest optimum growth temperature range (46-51C), whereas S. thermophile had the broadest range over which good growth occurred (36-43C). Optimum temperatures for the three organisms, T. aurantiacus , S. thermophile and C. thermophile were 48, 40 and 40C respectively. The effect of pressure on cellulose utilization, cell yield, growth rate and optimum growth temperature of the cellulolytic fungi Chaetomium thermophile var coprophile, Sporotrichum thermophile and Thermoascus aurantiacus was studied in especially designed pressure vessels. The optimum and limiting growth pressures of these fungi were also determined. The effect of pressure per se on the degree of polymerization was studied in uninoculated medium. Pressure above 75 psig was inhibitory to C. thermophile, while pressure above 90 psig was inhibitory to S. thermophile and T. aurantiacus. The growth and utilization of cellulose by S. thermophile and T. aurantiacus, however, increased under pressure and displayed a maximum between 30 and 45 psig. Pressure applied under growth conditions had no effect on cellulose depolymerization of cellulose of the three fungi; the optimum growth pressure was 40 psig.
W74-12193

RECLAMATION OF WATER FOR REUSE IN CHANNEL CATFISH RACEWAY SYSTEMS,
Memphis State Univ., Tenn. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W74-12203

AN ELECTROCHEMICAL METHOD FOR REMOVAL OF PHOSPHATES FROM WASTE WATERS,
Dynatech Corp., Cambridge, Mass.
S. E. Sadek.
Water Pollution Control Research Series, (1970). 47 p, 23 fig, 8 tab, 10 ref. FWQA Program No. 17010--02/70, 14-12-405.

Descriptors: Phosphates, *Electrochemistry, *Waste water treatment, *Electrodes, Costs, *Electrolysis, Flotation, Sewage treatment, Ion exchange, Ion transport.
Identifiers: Treatment costs, *Phosphates removal.

Phosphates in waste water may be removed electrochemically utilizing sacrificial electrodes. The electrode metal is first dissolved by the flow of current then precipitates out, removing from solution the phosphate ions. This removal is either dependent on chemical reaction of the metal cation and the phosphate anions or, possibly, on the adsorption of the phosphate by the metal hydroxide floc. Data on the phosphate removal was gathered using both aluminum and iron electrodes. Essentially complete removal was found to occur on using 300 coulombs/liter of charge flow with normal phosphate concentrations for both types of electrodes. Aluminum consumption averaged about 0.7 mass units per single mass unit of PO4 removed for essentially complete phosphate removal. This mass ratio was about 2 for iron electrodes. Treatment costs (excluding labor and filtration) have been estimated to be about 2.5 cents/1000 gal. and 8 cents/1000 gal. when using iron and aluminum electrodes respectively. Exploratory tests indicated that flotation by means of the hydrogen generated during the electrolysis may be used to remove suspended solids from raw sewage while phosphates are being removed.
W74-12209

EVALUATION OF POLYMERIC CLARIFICATION OF MEAT-PACKING AND DOMESTIC WASTEWATERS,
Metropolitan Sewer Board, St. Paul, Minn.
K. D. Larson, and D. A. Maulwurf.
Available from GPO Sup Doc as EP1.23:660/2-74-020, $2.30; microfiche from NTIS, Springfield, Va 22161 as PB-235 900, MF$2.25. Environmental Protection Agency, Technology Series EPA-660/2-74-020, April 1974. 197 p, 13 fig, 60 tab, 2 ref, 3 append. EPA Project 12130 EKK, Program Element 1BB037.

Descriptors: *Waste water treatment, Settling basins, *Polyelectrolytes, *Flocculation, Biochemical oxygen demand, Suspended solids.
Identifiers: *Polyelectrolyte treatment, Packinghouse waste water, *Polymeric clarification, Chemical treatment, Ferric chloride treatment.

Laboratory tests were conducted to determine which system of chemicals would be most effective on combined packinghouse and domestic waste. A dual system of chemicals was found which was effective in the treatment of this combined waste. This was a combination of ferric chloride and an anionic polyelectrolyte. This system was effective in forming a floc which would settle out under the dynamic conditions of the overloaded primary sedimentation tank. Treatment with this system could effectively reduce suspended solids in the effluent of the primary sedimentation tank over what could be achieved without the use of this dual system. This was demonstrated by running: (1) a parallel system of identical test and control tanks and, (2) full plant scale investigation for both test and control periods, kept as identical as possible. When full plant scale tests were run, laboratory data were collected from various sampling points throughout the plant during the test and control periods. A significant reduction of BOD and suspended solids was obtained in the primary sedimentation tanks and a change in efficiency was not observed on the trickling filters resulting in an overall reduction in these parameters in the effluent from the secondary sedimentation tank. The cost of chemically treating the combined 10 mgd of wastewater would be approximately $45 per million gallons and would be less for strictly domestic wastes. (EPA)
W74-12210

BRINE DISPOSAL TREATMENT PRACTICES RELATING TO THE OIL PRODUCTION INDUSTRY,
Oklahoma Univ. Research Inst., Norman. School of Civil Engineering and Environmental Science.
G. W. Reid, L. E. Streebin, L. W. Canter, and J. R. Smith.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-037, $2.90; microfiche from NTIS. Springfield, Va 22161 as PB-235 886, $2.25. Environmental Protection Agency Technology Series Report EPA-660/2-74-037, May 1974. 275 p, 28 fig, 16 tab, 68 ref, 5 append. EPA Project 14020 FVW, 14-12-873.

Descriptors: *Oil industry, *Brine disposal, *Cost analyses, Permits, Evaporation, Injection wells, Cost comparisons, *Waste water disposal, Waste disposal, *Waste treatment, *Alternative costs, State governments.
Identifiers: Brine disposal costs, State-permitted brine disposal mechanisms.

Methodology is developed for the economic evaluation of environmentally acceptable brine disposal systems. Specifically, a procedure is presented for determining total unit costs of alternative systems. These are then compared in order to select the least expensive, legally-permitted disposal processes. A broad and simplified discussion of resources economics is included. Disposal mechanisms and disposal cost analyses are described. Methods are included for obtaining the necessary information for use in the analyses. A

listing is made of state regulatory agencies and their roles in administering brine disposal policies. (Pfeffer-EPA)
W74-12211

WASTE OIL RECYCLING AND DISPOSAL,
Recon Systems, Inc., Princeton, N.J.
N. J. Weinstein.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-052, $4.00; microfiche from NTIS, Springfield, Va 22161 as PB-236 148, MF2.25. Environmental Protection Agency, Cincinnati, Ohio, Technology Series, August 1974. 327 p, 9 fig, 42 tab, 88 ref, 7 append. 1BB041 ROAP 21AVJ/TASKS 09 & 21, 68-01-1870 and 68-03-0394.

Descriptors: *Waste disposal, *Waste treatment, Fuels, Wastes, Pollution, Collection, *Oil wastes, *Oil pollution, *Recycling, Industrial wastes.
Identifiers: *Waste crankcase oil, *Waste oil re-refining, Waste industrial oil, Waste lube oil, *Waste oil collection, Recovery and reuse.

Information was developed on sources and quantities of waste oils, current and potential recycle and disposal methods, and the environmental impact of these methods. In addition to an extensive literature search, surveys (of rerefiners, collectors and processors, the Pittsburgh Pennsylvania Metro area and Standard Industrial Classification groups) were conducted to develop information reported. (EPA)
W74-12215

SOIL MODIFICATION FOR DENTRIFICATION AND PHOSPHATE REDUCTION OF FEEDLOT WASTE,
Michigan State Univ., East Lansing. Dept. of Crop and Soil Sciences.
A. E. Erickson, B. G. Ellis, J. M. Tiedje, C. M. Hansen, and F. R. Peabody.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-057, $1.60; microfiche from NTIS, Springfield, Va 22161 as PB-235 909, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-057, June 1974, 118 p, 9 fig, 24 tab, 10 ref. EPA Project 13040 FYK, Program Element 1BB039.

Descriptors: Hogs, Dairy industry, *Denitrification, *Aerobic treatment, Anaerobic conditions, *Soil treatment, Waste treatment, *Farm wastes, *Phosphates, Feed lots, Biodegradation, Pilot plants, *Waste water treatment.
Identifiers: Barriered landscape water renovation systems, Organic matter decomposition, Phosphate fixation.

The efficiency of pilot-size Barriered Landscape Water Renovation Systems (BLWRS) to renovate flushed livestock waste was studied. The BLWRS is a modified permeable soil that has an aerobic zone for the filtering and oxidation of the waste and an anaerobic zone to which an energy source is added to create an environment for denitrification. Two pairs of BLWRS 0.008 ha. in size were constructed using a polyvinyl barrier to create the anaerobic zone and contain the effluent. Flush waste from swine or dairy cattle were applied on each pair of BLWRS. The waste effluents and BLWRS soil were periodically analyzed for nutrients, oxygen demand and pathogens. At manure loading rates of up to 122 t/ha. swine waste and 93 t/ha. of dairy waste, the BLWRS had an efficiency of 80% and 97% for nitrogen renovation, greater than 99% for phosphate and 93% for carbon. The oxygen demand dropped 50- to 100- fold. Under normal operating conditions, the pathogenic indicator organisms did not appear in the effluent. The BLWRS has been shown to be an efficient system for renovating large quantities of livestock waste and should be tested on a commercial scale with continuous monitoring. (EPA)
W74-12216

LIQUID AEROBIC COMPOSTING OF CATTLE WASTES AND EVALUATION OF BY-PRODUCTS,
Chino Basin Municipal Water District, Cucamonga, Calif.
F. Grant, and F. Brommenschenkel, Jr.
Copy available from GPO Sup Doc as EP1.23:660/2-74-634, $0.95; microfiche from NTIS as PB-235 914. Environmental Protection Agency Technology Series Report EPA-660/2-74-034, May 1974, 50 p, 2 fig, 16 tab, 36 ref, append. EPA Project S801647 (13040 HPV), Program Element 1BB039.

Descriptors: *Farm wastes, *Aerobic treatment, *Byproducts, Economic feasibility, Biological oxygen demand, Chemical oxygen demand, Dissolved solids, *Waste treatment, Feasibility studies, Costs, Dairy industry.
Identifiers: Volatile solids, Thermophilic reactors, Mesophilic reactors, Total dissolved solids, *Liquid composting.

The technical and economic feasibility was determined of treating dairy waste in a liquid state by a tandem thermophilic-mesophilic aerobic stabilization process, more commonly described as liquid composting. Experimental apparatus were set up at an operating dairy. A large fraction of dairy manure is relatively resistant to rapid biological degradation even at thermophilic temperatures. Antithertical requirements of sufficient oxygen for maximum biological activity and minimum air flow to preclude the need for an external heat source could not be satisfied with the particular experimental apparatus when utilizing air as the oxygen source. Improved results were obtained with an oxygen-enriched air supply which pointed out the potential advantage of a pure oxygen system. Preliminary cost estimates for a liquid composting process to serve 500 cows were developed within the context of current dairy operation economics. The process is considerably more costly than current, conventional, composting, operations. The cost of the process is substantially above levels which could be maintained by dairy operations. (EPA)
W74-12222

ACTIVE PROJECTS, PURE WATERS RESEARCH.
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 10C.
W74-12234

CHATTANOOGA AREA REGIONAL COUNCIL OF GOVERNMENTS COMPREHENSIVE WATER AND SEWER STUDY: HAMILTON, WALKER AND CATOOSA COUNTIES, BOOK TWO.
Hensley-Schmidt, Inc., Chattanooga, Tenn.
For primary bibliographic entry see Field 6A.
W74-12242

NITROGEN REMOVAL AND PHOSPHORUS PRECIPITATION IN A COMPARTMENTALIZED AERATION TANK,
New York State Dept. of Environmental Conservation, Albany.
C. Beer, and L. J. Hetling.
February 1974. 23 p, 25 fig, 13 ref. EPA, 17050 EDL.

Descriptors: *Waste water treatment, *Sewage treatment, *Activated sludge, *Pilot plant, *Denitrification, *Aeration, Municipal wastes, Treatment facilities, Treatment, Aerobic treatment, Water pollution control, Biological treatment, Flow control, New York.
Identifiers: *Nitrogen removal, *Phosphorus precipitation, Compartmentalized aeration tank, Flow equalization, Ferric chloride, Anoxic cell.

With a view to the importance of the activated sludge process in the New York State water pollution program, the State of New York embarked in 1968 on a research and development program in the area of activated sludge. It was hoped that results of that program might help to operate existing activated sludge plants more efficiently and, perhaps, to develop modifications that could be incorporated in these plants for achieving greater removals of contaminants. It was also hoped that processes could be developed that would influence the design of plants not yet on the drawing board. As a vehicle for the research and development program drawn up, it was decided to construct an experimental sewage treatment plant that would serve one of the state's institutions, the Coxsackie Correctional Facility. A modification of the biological nitrogen removal process described by Wuhrman (W70-04764) was combined with the phosphorus removal process based on the addition of ferric chloride to the aeration tank of the activated sludge system as described by Thomas and Wildi (W73-07465). Good results were obtained in treating approximately 95,000 gallons per day of institutional sewage. A compartmentalized aeration tank (11 compartments) was used, with arrangement for aerobic treatment after denitrification and before final settling. The required ferric chloride addition for phosphorus elimination was much less than the stoichiometric requirement. (Poertner)
W74-12243

THE ELECTRICAL PROCESS IN THE BREAKING OF DILUTE OIL-IN-WATER EMULSIONS,
Georgia Inst. of Tech., Atlanta. High Temperature Materials Div.
C. Orr, Jr., and E. Y. H. Keng.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 908, $3.00 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No. ERC-0674, June 1974. 15 p, 2 fig, 2 tab, 4 ref. OWRT A-049-GA(1). 14-31-0001-4010.

Descriptors: Water pollution control, *Zeta potential, Electrical properties, *Emulsions, *Oil-water interfaces, *Oil wastes, *Industrial wastes, Oily water, Separation techniques, Waste water treatment.
Identifiers: Oil-water emulsions, Grease, Wax.

Oils, greases, and waxes frequently occur in industrial waste waters as highly dispersed droplets. Simultaneously, soaps and detergents enter most waste waters from domestic and other sources. When the mixtures of waste particles in water, known as emulsions, come in contact with the soaps and detergents, they generally become quite stable. One way to break such emulsions and thereby separate out the wastes is to add chemicals that will cause the oil droplets to agglomerate into larger drops. The problem is to determine just which chemical and what quantity of that chemical is needed to induce a given emulsion to agglomerate (break). This study sought to assess the usefulness of electrical measurements, particularly the so-called zeta potential, in guiding the treatment process to chemicals and application rates that can break measured emulsions. When the zeta potential, which for a highly stable emulsion may be as negative as -0.090 volt, is made to approach -0.015 volt, the stability of the emulsion deteriorates rapidly. Past this point, oil-in-water emulsions often break spontaneously. The larger drops will than rise to the water surface and form a distinct oil layer that can be easily removed. Laboratory applications of various chemicals to emulsion samples and subsequent zeta potential measurement should thus provide a ready guide to those trying to remove oily waste water discharges. (James-Georgia Tech)
W74-12343

TREATMENT OF WASTE WATER FROM FISH AND SHELLFISH PROCESSING PLANTS,
Rhode Island Univ., Kingston. Dept. of Chemical Engineering.
H. N. Knickle.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 925, $3.25 in paper copy, $2.25 in microfiche. Completion Report, July 31, 1974. 35 p, 3 fig, 9 tab, 6 ref. OWRT A-048-RI(1). 14-31-0001-3840.

Descriptors: *Waste water treatment, Water pollution, *Filtration, Reverse osmosis, Adsorption, *Chemical precipitation, Economics, *Food processing industry, *Industrial wastes, Effluents.
Identifiers: Fish processing wastes, Shellfish processing wastes.

Some of the simpler methods for treating liquid effluent from fish and shellfish processing plants have been studied with particular emphasis on their effectiveness and economy. These include filtration, reverse osmosis, adsorption, and chemical precipitation. In addition, the wastewater from an operating shellfish plant has been characterized. Filtration and chemical precipitation both appear to be effective and economical treatment methods.
W74-12346

PROCEEDINGS OF THE XV EUCEPA CONFERENCE ON HARMONIZING PULP AND PAPER INDUSTRY WITH ENVIRONMENT,
For primary bibliographic entry see Field 5G.
W74-12400

A TOTAL PROCESS APPROACH TO WATER AND WASTE MANAGEMENT IN AN EXPANDING FINE PAPER MILL,
Papeteries de Virginal (Belgium).
G. W. Ruth, and J. Catterall.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 143-159, 1973. 3 fig, 1 tab, 8 ref.

Descriptors: *Pulp wastes, *Solid wastes, *Sludge, Treatment facilities, Waste treatment, *Waste water treatment, *Water purification, Water supply, Pulp and paper industry, Europe, Ion exchange, Filtration, Flocculation, Mixing, Flotation, Aeration, Landfills, Lime, Sumps, Pumps, Effluents, Polyelectrolytes, Boiler feed water, Industrial water, Water conservation, Recirculated water.
Identifiers: *Belgium, White water(Paper machine), Charleroi Canal(Belgium), Sennette River(Belgium).

A Belgian fine-paper and coated-paper mill (owned jointly by a U.S. and a British company) manufactures lightweight papers, especially optical character recognition (OCR) papers. It generates only enough steam for drying and space heating and no electric power. Boiler feed water from the Sennette River is pretreated with lime and by ion-exchange. Additional water supply comes from the Charleroi canal since the mill expanded from 75-110 to 200-250 daily tons by replacement of one of the two older machines with a high-speed paper and coating machine. Machine white water flows through mesh screens into two separate sumps equipped with submerged centrifugal pumps which deliver the effluent to the mixing chamber of an 85-ft clarifier where sulfuric acid and lime may be added. The center of the clarifier is equipped with a rake, raise-lower facilities, skirt, and flocculating turbines. The clarified effluent (with or without alum and polyelectrolyte addition) passes to an aeration basin having a 6-hp floating aerator and then is either discharged to the river or to a second chamber from which it can be recycled to the raw water sumps or discharged to the canal. Sludge from the clarifier is pumped to a thickener and to a vacuum drum filter and is disposed of by hauling to a landfill site. (See also W74-12400) (Brown-IPC)
W74-12407

THE POLLUTION-FREE MILL: FACTS AND VISIONS,
Lekanders Ingenjorsbyra A.B., Alingas (Sweden).
K. E. Lekander.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, p 161-170, 1973. 8 fig.

Descriptors: *Pulp wastes, *Bleaching wastes, *Water pollution control, *Pollution abatement, *Waste water treatment, Waste treatment, Air pollution, Europe, Pulp and paper industry, Water conservation, Recirculated water, Water pollution sources, Sulfite liquors.
Identifiers: Kraft mills, Sulfite pulp mills, *Sweden, Condensates, Evaporator condensates, Barking(Debarking), Closed systems.

Since the Swedish pulp and paper industry is responsible for over half of the total organic matter discharged into streams, as well as for considerable emissions of atmospheric sulfur dioxide, a three-year study project was conducted during 1970-1973 with the aid of about 100 scientific experts and a $6 million budget to focus on technologically feasible pollution control measures. Several changes in the operating procedures and practices of mills are recommended, which should considerably reduce the pollution load from both kraft and sulfite mills. These changes are discussed and include, e.g., conversion from wet to dry debarking of pulpwood, stripping and reuse of evaporator condensates, and closure of the pulp cooking, washing, screening, and drying cycle. (See also W74-12400) (Brown-IPC)
W74-12408

TREATMENT OF CONDENSATE,
Angpanneforeningen, Stockholm (Sweden).
O. Axelsson, and S. E. Jonsson.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 201-227, 1973. 15 fig, 10 tab, 8 ref.

Descriptors: Treatment facilities, *Pulp wastes, Condensation, Byproducts, Pollution abatement, *Waste water treatment, Waste treatment, Liquid wastes, Odor, Biochemical oxygen demand, Sulfite liquors, Alcohols, Costs, Operating costs, Water pollution control, Recycling, Recirculated water, Water reuse, Neutralization, Steam, Water vapor, Gases, Water pollution sources, Pulp and paper industry, Biological treatment.
Identifiers: Kraft mills, *Sulfite pulp mills, *Condensates, *Evaporator condensates, *Digester condensates, Digesters(Pulp mill), Evaporators, Furfural, Methanol(Methyl alcohol), Formic acid, Acetic acid, Spent pulping liquors.

Steam and vapor condensates from kraft and sulfite pulp mill digesters and evaporators are discussed with regard to reduction of BOD and odor emissions by various technological measures, notably neutralization of spent pulping liquors, recovery of by-products (such as methanol, furfural, and formic and acetic acids) from the condensates, biological effluent treatment, improved extraction of spent liquors, and recirculation of condensates to the acid-making (cooking liquor preparation) stage. The comparative costs of various treatment processes are also indicated. (See also W74-12400) (Brown-IPC)
W74-12409

SOME SYSTEMS DEVELOPED FOR POLLUTION ABATEMENT IN THE PULP INDUSTRY, PARTICULARLY OXYGEN BLEACHING,
Mo Och Domsjo A.B., Ornskoldsvik (Sweden).
I. Croon.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 229-253, 1973. 24 fig.

Descriptors: *Water pollution control, *Pulp wastes, Pulp and paper industry, *Pollution abatement, Air pollution, *Bleaching wastes, Economics, *Costs, Oxygen, Oxidation, Effluents, Sulfur compounds, Odor, Europe, Canada, Water conservation, Industrial wastes, Waste treatment, Biochemical oxygen demand, Color, Toxicity.
Identifiers: *Kraft mills, Sweden, Debarking(Barking), *Oxygen bleaching, Pulp washing, Condensates, Gas scrubbing, Closed systems.

Recent developments in oxygen bleaching of pulp promise to reduce not only the BOD, toxicity, and color of bleach plant effluents but also the total volume of aqueous discharges from pulp and paper mills. Further aids to the reduction of water pollution include dry debarking of pulpwood logs, closed-circuit screening and countercurrent washing of pulp, and treatment of condensates from digesters and evaporators. By converting to oxygen bleaching sequences in conjunction with steam stripping of condensates, a kraft pulp mill may eliminate 65% of its effluent BOD and 70% of the color load while saving at least $5 per ton of pulp in chemical costs, without affecting the quality of the pulp produced. Odiferous sulfur emissions from various sites in the mill can be collected, scrubbed, and/or subjected to thermal oxidation. Black liquor (spent alkaline pulping liquor) can be oxidized to minimize reduced sulfur compounds (such as mercaptans and hydrogen sulfide) in flue gases from direct-contact evaporators. The main sources of sulfur dioxide emissions is the recovery furnace stack. They can be minimized by scrubbing flue gases with alkaline solutions. The MoDo scrubber combines this process with heat recovery. Progress along these lines Mo och Domsjo AB. in Sweden and by Chemetics Ltd. in Canada is emphasized. (See also W74-12400) (Brown-IPC)
W74-12410

PULP MILL WATER SYSTEM CLOSURE,
Swedish Forest Products Research Lab., Stockholm.
N. Hartler.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 267-281, 1973. 15 fig.

Descriptors: *Water reuse, *Water conservation, *Industrial water, *Recirculated water, *Water pollution control, *Pollution abatement, *Pulp and paper industry, Pulp wastes, Effluents, Waste treatment, Waste water treatment, Operation and maintenance, Bleaching wastes.
Identifiers: Closed systems, Pulp mills, Unbleached pulps, Bleached pulps.

The closure of pulp mill water circuits is attractive for several reasons, including pollution abatement, freshwater conservation, and reduced fiber losses. Key points in closed production lines and some of the attendant problems are discussed, viz., (1) screening as an integral part of pulp washing; (2) cleaning and/or recycling of condensates; (3) system closure within and between filter washing stages; (4) cooking of pulpwood to higher delignification degrees; (5) replacement of Cl by chlorine dioxide; (6) separation of free chloride from organic substances; (7) secondary effluent treatment; and (8) leakage and accidental disturbances. System closure is approaching practical fulfillment for unbleached but not yet for bleached pulp manufacturing lines on which further research is needed. (See also W74-12400) (Brown-IPC)
W74-12411

ESTABLISHMENT OF A CLOSED SYSTEM FOR THE PAPER MAKING PROCESS,
T. Franzen, C. Heinegard, S. Martin-Lof, C. Soremark, and D. Wahren.

In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 311-336, 1973. 14 fig, 2 tab.

Descriptors: *Pulp wastes, *Pollution abatement, *Water pollution control, *Recirculated water, *Water purification, *Waste water treatment, Pulp and paper industry, Recycling, Economics, Discharge(Water), Slime, Operation and maintenance, Equipment, Temperature, Water properties, Industrial water, Effluents.
Identifiers: Closed systems, Paper machines, White water(Paper-machine), Papermaking.

Internal system closure represents one alternative measure for pollution abatement in paper mills. Such measures have several advantages over external effluent treatment method, provided that care is taken to avoid impairment of operating conditions and/or of product quality. Experience gained in many paper mills with the full or partial closure of the white water circuit has shown that a substantial part of conventionally discharged pollutants can be excluded from effluents and reused in paper products without negative effects. In many instances, such system closures have improved not only the mill's operating conditions, such as paper machine drainage and minimized slime deposits, thanks to increased water temperatures, but also the optical and mechanical properties of the paper sheet. Moreover, savings in fiber consumption and heat supply amounting to $10 to $15 per ton of paper can be realized by various circuit-closing measures, such as recirculation of internally cleaned white water as shower, cooling, and sealing water. An appendix gives calculations of the materials balance and discusses the concentration relationships resulting from a white water system closure. (See also W74-12400) (Brown-IPC)
W74-12412

DESIGN PRINCIPLES OF WHITE WATER SYSTEMS WITH SPECIAL REFERENCE TO EFFLUENT CONTROL,
Jaakko Poyry and Co., Helsinki (Finland).
P. Aaltonen, M. Nyyssola, and S. Von Troil.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 337-349, 1973. 2 fig, 2 tab.

Descriptors: *Water conservation, *Industrial water, *Waste water(Pollution), *Recirculated water, *Pulp wastes, *Pulp and paper industry, Freshwater, Design, Equipment, Monitoring, Suspended solids, Colloids, Dissolved solids, Water pollution control, Pollution abatement, Design criteria.
Identifiers: Paper machines, Fourdrinier machines, Sheet formers(Paper-machine), Closed systems, White water(Paper-machine).

Basic principles for designing process water circuits for a fourdrinier paper machine are discussed, notably the controlled use of freshwater, observations of stock and water system dynamics, and monitoring of suspended, dissolved, and colloidal materials. The presence of more than one machine or modern nonfourdrinier sheet formers in a single mill may alter the system design. (See also W74-12400) (Brown-IPC)
W74-12413

FRACTIONAL INPLANT TREATMENT OF RECYCLE FLOWS BY ADVANCED TECHNIQUES,
Institute of Paper Chemistry, Appleton, Wis.
A. J. Wiley.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 351-362, 1973. 5 fig, 1 tab, 9 ref.

Descriptors: *Waste water treatment, *Pulp wastes, *Bleaching waters, *Recirculated water, *Water conservation, *Treatment facilities, *Reverse osmosis, Membrane processes, Adsorption, Activated carbon, Electrodialysis, Freeze drying, Filtration, Flotation, Pulp and paper industry, Industrial water, Water purification, Waste water(Pollution), Recycling.
Identifiers: Ultrafiltration, Savealls, Woodrooms(Pulp mill), Bleach plants(Pulp mill), Pulp washing, Paper machines, Papermaking, Pulp mills, Paper mills.

The papermaking process can be divided principally into five main unit operations, viz., the woodroom, the pulp mill, the pulp washing plant, the bleach plant, and the machine room, each comprising facilities for water processing, such as clarifiers, pulp presses, drum filters, washing presses or filters, and flotation savealls. The total system design principle, however, calls for recycling of waste waters from later to earlier stages after appropriate purification. Novel technological approaches under investigation include reverse osmosis, ultrafiltration, activated carbon adsorption, electrically drive membrane processes (such as electrodialysis), and freeze concentration. Work performed particularly on reverse osmosis at the Institute of Paper Chemistry is reported. (See also W74-12400) (Brown-IPC)
W74-12414

CLARIFICATION OF WHITE WATER BY VACUUM FILTRATION (KLAERUNG VON WEISSWASSER DURCH VAKUUM-FILTRATION),
R. F. Kozich.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 363-376, 1973. 13 fig.

Descriptors: *Water treatment, *Waste water treatment, *Filtration, *Pulp wastes, *Industrial water, Pulp and paper industry, Water purification, Waste treatment, Additives, Flotation, Slime, Foaming, Operation and maintenance, Recirculated water, Water conservation, Equipment, Design, Design criteria.
Identifiers: Paper machines, White water(Paper-machine), Paper additives, Closed systems.

Factors affecting the design of white water (paper machine) circuits are discussed, including water volume, retention of fillers and fines (fine fibers), beating degree, filter aids, mineral (ash) content, and paper grades. Advantages of vacuum filtration over other white water purification processes are outlined. They include ready adaptation to different paper machines and paper qualities; elimination or minimized use of flocculants or other chemical additives; lower foam (gas) content in the machine headbox than with flotation savealls; fewer organic flock and slime deposits; insensitivity to changes in water influx; stable operation with little supervision; reduced space requirements; and reuse of treated white water as shower spray water. (See also W74-12400) (Brown-IPC)
W74-12415

EFFECTS OF RAW MATERIALS AND CHEMICAL ADDITIVES ON MILL EFFLUENT LOSSES,
Research Association for the Paper and Board, Printing and Packaging Industries, Leatherhead (England).
W. G. Cobett, R. A. Granville, and R. D. Isabell.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 377-391, 1973. 1 fig, 6 tab, 7 ref.

Descriptors: *Pulp wastes, *Biochemical oxygen demand, *Water pollution control, *Pollution abatement, *Additives, *Chemicals, Pulp and paper industry, Effluents, Suspended solids, Dissolved solids, Waste water treatment, Waste treatment, Industrial wastes, Costs, Pollutants, Water conservation, Water reuse, Recirculated water.
Identifiers: Waste papers, Retention aids, Stock preparation(Pulp), Paper additives.

The most logical first step toward reduced water pollution at a pulp or paper mill is to maximize water recirculation and thus cut the freshwater intake. This will both simplify the task and lower the costs of removing suspended solids and BOD from effluents. For maximizing treatment cost savings, the reduction of water pollution achieved should be judged in terms of load (kg/day) rather than of concentration (mg/liter). The solubles in paper mill effluents derived from wood pulps are not greatly affected by variations in stock preparation and cannot be substantially reduced by common procedures. However, the appropriate choice of chemical additives, such as beater and surface sizing agents, may improve the retention of water solubles in the sheet and lessen the effluent BOD load. Despite this judicious selection, high pollution loads will still arise from contaminants in poorer grades of waste paper furnishes. The use of low-BOD additives, such as carboxymethylcellulose, may provide only temporary relief, since stricter demand by pollution control authorities may pose the later problem of removing these additives from the effluent. Details are reported of research studied conducted by PIRA on sources of BOD in different kinds of wood pulps (mechanical, sulfite, kraft, neutral semichemical sulfite, softwood, hardwood, etc.) and various furnish additives, such as rosin size, alum, oxidized starch, cationic starch, and the like. (See also W74-12400) (Brown-IPC)
W74-12416

MECHANICAL TREATMENT OF PULP AND PAPER MILL EFFLUENT,
Nevalainen and Orivuori, Helsinki (Finland).
J. Koljonen.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 435-448, 1973. 1 fig, 3 tab.

Descriptors: *Treatment facilities, *Pulp wastes, *Waste treatment, *Waste water treatment, *Suspended solids, *Costs, *Economics, *Capital costs, *Operating costs, *Sludge treatment, Discharge(Water), Waste water(Pollution), Filtration, Centrifugation, Flotation, Effluents, Energy, Sludge disposal, Liquid wastes, Solid wastes, Industrial wastes, Pulp and paper industry, Europe, Water pollution sources, Water pollution control, Pollution abatement.
Identifiers: Kraft mills, Sulfite mills, Woodrooms, Barking(Debarking), Finland.

The screening and clarification of kraft and sulfite pulp mill barking room (woodroom) effluents by mechanical methods such as flotation, filtration, and centrifugation are discussed, including treatment and disposal of the resulting sludges. Investment and operating costs of mechanical processes depend on the quality and quantity of effluents, the allowable suspended solids content of the treated discharges, the space available for treatment facilities, and sludge handling problems. For large Finnish mills with maximum allowable discharges of 8 to 15 kg suspended solids per tone of product, the removal of 1 ton suspended solids per day requires a capital investment of ca. $120,000 and a total expense (with 6% interest over 20 years) of 0.5 cent per cu m of effluent treated, provided that no chemical flocculants are needed. The energy demand of mechanical treatment installations is about 20 kw per ton of suspended solids removed daily. (See also W74-12400) (Brown-IPC)
W74-12418

THE USE OF SILICATES AND POLYELECTROLYTES FOR FLOCCULATION,
Papiripari Vallalat Kutato- es Fejlesztointezete, Budapest (Hungary).
P. Lengyel, K. Engelhoffer, and J. Papp.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 491-503, 1973. 6 fig, 4 tab, 7 ref.

Descriptors: *Waste water treatment, Waste treatment, *Pulp wastes, Additives, *Suspended solids, *Chemical oxygen demand, *Silicates, Zeolites, Clays, Montmorillonite, *Polyelectrolytes, *Flocculation, Sedimentation, Chemical precipitation, Colloids, Aluminum, Ion exchange, Kaolinite, Bentonite, Kaolin minerals, Hydrogen ion concentration, Neutralization, Effluents, Sludge, Recycling, Water pollution control, Pollution abatement.
Identifiers: *Alum(Aluminum-potassium sulfate), Waste paper, Swelling, Swellability, Specific surface, Surface area.

The characteristics and purification of mill effluents are discussed with special reference to a paper mill in which large amounts of waste paper fibers are recycled. Laboratory studies are reported concerning the effects of alum, silicates, and polyelectrolytes on the COD and sediment solids content of paper-machine waste waters (white waters). Silicate additives (including sodium carbonate-activated bentonites, kaolins, and zeolites) were tested for montmorillonite content, ion-exchange capacity, swellability, and specific surface area in order to seek relationships between these characteristics and the effluent-purifying efficiency of the compounds. Also determined were those alum levels required to give a sediment-free effluent and beyond which no significant further COD reduction was evident. It was found that a part of the alum needed to remove colloidal and suspended solids could be replaced by certain silicates while keeping the pH of the clarified water neutral, so that no further pH adjustment was necessary prior to discharge or recirculation of effluent waters. A relationship was also found between the physical characteristics of silicates on one hand and the sedimentation rate of suspended solids and the sludge volume produced on the other hand. (See also W74-12400) (Brown-IPC)
W74-12420

THE BIOLOGICAL PURIFICATION OF PAPER INDUSTRY WASTE WATERS (DIE BIOLOGISCHE REINIGUNG VON RESTABWAESSERN DER PAPIERINDUSTRIE),
Cellulose Attisholz A.G., Luterbach (Switzerland).
A. Scherler.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 505-521, 1973. 4 fig, 12 tab.

Descriptors: *Biological treatment, *Pulp wastes, Treatment facilities, Waste treatment, *Waste water treatment, *Pollution abatement, Economics, *Operating costs, Costs, Sludge treatment, Biochemical oxygen demand, Oxidation, Biodegradation.
Identifiers: Attisholz process(Effluent treatment).

After a review of the four main types of available biological treatment processes (trickling filters, total oxidation, and single- and two-stage sludge), the design and operation of the two-stage Attisholz process are discussed in some detail. This treatment is said to operate most economically, i.e., at a total cost of ca. 15 Swiss francs per ton of product (including capital interest, sludge utilization, and preclarification) while reducing effluent five-day BOD to ca. 0.4-kg per ton of paper. (See also W74-12400) (Brown-IPC)
W74-12421

TERTIARY METHODS OF WASTE TREATMENT,
Balfour-Italia, Rome (Italy).
J. R. Simpson, G. A. Truesdale, and L. Baruchello.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment, held in Rome, May 7 to 11, 1973, p 523-533, 1973. 1 tab, 3 ref.

Descriptors: *Tertiary treatment, *Waste treatment, *Waste water treatment, *Pulp wastes, *Biochemical oxygen demand, *Suspended solids, *Capital costs, Costs, Treatment facilities, *Filters, *Filtration, Bacteria, Irrigation, Soil disposal fields, Lagoons, Biological treatment, Pulp and paper industry, Effluents.
Identifiers: Microstrainers, Immedium filter, Simater filter.

After full-scale biological treatment of effluents to at least 20 mg/liter of BOD and 30 mg/liter of total suspended solids (TSS), residual objectionable constituents may require further treatment. Such tertiary processing cannot be justified solely for improving the effluent quality of an inefficient secondary treatment system, since the capital costs for achieving ultimate BOD and TSS values of 10 and a final ammonia N content of 3.5 mg/liter are 25% higher than those for BOD reduction to 20 and TSS reduction to 30 mg/liter. Various tertiary polishing methods are compared, including irrigation over grasslands, lagooning, slow and rapid gravity sand filters, 'Immedium' upward-flow and 'Simater' radial-flow sand filters, microstrainers, gravel-bed clarifiers, and bacteria removal. (See also W74-12400)
W74-12422

ACTIVATED CARBON AND OTHER TECHNIQUES FOR COLOR REMOVAL FROM KRAFT MILL EFFLUENTS,
Saint Regis Paper Co., Pensacola, Fla.
W. G. Timpe, and E. W. Lang.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 535-557, 1973. 10 fig, 8 tab, 32 ref.

Descriptors: *Activated carbon, *Pulp wastes, *Waste water treatment, *Bleaching wastes, *Biological treatment, Color, Reverse osmosis, Ion exchange, Lime, Lignins, Membrane processes, Biochemical oxygen demand, Pulp and paper industry, United States, Water consumption(Except consumptive use), Suspended solids, Dissolved solids, Costs, Operating costs, Water reuse.
Identifiers: Alum(Aluminum-potassium sulfate), Kraft mills.

Of the 2100 billion gal of water consumed annually by the U.S. paper industry 1500 billion are used by the kraft industry. Manufacture of kraft paper requires 10,000 to 60,000 gal (average 27,000 gal) of water per ton. Effluent contaminant range from truly dissolved to suspended materials. Clarification and bio-oxidation processes can remove all suspended solids and 90% of the 5-day BOD in modern mills. Effluent color (light to dark brown, exceeding 500 APHA color units) represents about 50% of dissolved organics and is caused mainly by black liquor lignin (representing 2-7% losses from the system) and by lignin degradation products formed during pulp bleaching. In the U.S.A. five commercial lime treatment systems operated on kraft and mixed effluents for color removal, which ranges from 60 to 95% at a lime pH of 11.5 or above. Although alum can remove color at pH 5-6 more effectively than lime, its use is burdened by sludge handling and chemical recovery problems. Reverse osmosis through cellulose acetate membranes can achieve high color removals, but is presently uneconomical for kraft effluents. Cross-flow ultrafiltration through dynamically formed membranes at lower applied pressures can remove up to 99% of color, but is still in laboratory development stages. Some success has been achieved also with ion-exchange of bleach plant effluents. Pilot plant trials gave color removals to below 10 C.U. from unbleached kraft effluents and produced reuseable water by passage through multiple carbon columns after lime pretreatment. Costs of this process are less than for carbon treatment preceded by bio-oxidation and clarification (or by clarification alone) where discharged water quality requires 90% of BOD removal and color removal to 200 C.U. or less. A new carbon contact technique with still better economy is under development. (See also W74-12400) (Brown-IPC)
W74-12423

NEW FINE PARTICLE TECHNOLOGIES APPLIED TO THE ENVIRONMENTAL PROBLEMS OF THE PAPER INDUSTRY,
English China Clays Ltd., Saint Austell (England).
N. O. Clark.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 559-571, 1973. 8 fig, 1 tab.

Descriptors: *Sludge treatment, *Sludge disposal, *Particle size, *Solid wastes, *Liquid wastes, *Industrial wastes, *Pulp wastes, *Waste treatment, *Separation techniques, Equations, Darcys Law, Stokes Law, Clays, Calcium carbonate, Flocculation, Polyelectrolytes, Chemical precipitation, Water pollution control, Pulp and paper industry.
Identifiers: Kynch equation, Poiseuille equation, Talc, Polacrylamide.

Pollution by solids or liquids is easier to control than is the processing of sludges which require separation into a solid and a liquid phase. The separation of fine particles involves four theoretical equations, namely, Stoke's, Kynch's, Darcy's, and Poiseuille's Laws. The application of these physical-engineering principles to the practical removal or recovery of minerals, such as clays, talc, and calcium carbonate, is discussed and illustrated, including the use of retention and flocculation aids, such as polyacrylamide. (See also W74-12400) (Brown-IPC)
W74-12424

A STUDY OF THE EFFLUENT TREATMENT FROM AN ITALIAN PAPER MILL,
Cartiera del Timavo, Trieste (Italy).
R. Ferretti.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 573-584, 1973. 11 fig.

Descriptors: *Pulp wastes, *Treatment facilities, Europe, Biochemical oxygen demand, Suspended solids, Flocculation, Filtration, Coagulation, Chemical precipitation, Bentonites, Aluminum, Polyelectrolytes, Filtration, Effluents, Waste treatment, *Waste water treatment, *Pollution abatement, Pulp and paper industry, Water pollution control, Industrial wastes.
Identifiers: Alum(Aluminum-potassium sulfate), White water, *Italy.

Antipollution treatments applied by an Italian groundwood pulp, newsprint, and printing paper mill to minimize BOD loadings and total suspended solids in its aqueous effluents are discussed and illustrated. Depending on the varying characteristics of discharges (from the barker room, grinder room, wire and felt showers, washing and cooling waters, etc.), the facilities provide a range of simple to sophisticated mechanical and chemical treatments, from decanters and bark-based filter basins to chemical flocculation and coagulation with alum, bentonite, and/or polyelectrolytes. Maximum BOD and suspended solids discharges of 20-30 ppm are reported. (See also W74-12400) (Brown-IPC)
W74-12425

THE ROLE OF THE CHEMICALS USED IN PAPER AND PAPER BOARD MAKING IN MINIMISING EFFLUENT PROBLEMS,
Imperial Chemical Industries Ltd., London (England).
For primary bibliographic entry see Field 5G.
W74-12427

SYSTEM OF COMBINED AND PROFOUND TREATMENT OF PULP AND PAPER INDUSTRY WASTE WATERS WITH ACTIVATED SLUDGE,
Vsesoyuznyi-Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost, Moscow (USSR).
N. A. Evilevitch, M. A. Lomova, M. M. Nikiforov, B. S. Pritsker, and A. Ya. Tipisev.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 763-767, 1973.

Descriptors: *Treatment facilities, *Pulp wastes, *Activated sludge, *Aeration, *Biodegradation, Foreign research, *Biological treatment, Aerated lagoons, Waste water treatment, Waste treatment, Industrial wastes, Pulp and paper industry, Oxidation, Organic loading, Biochemical oxygen demand, Nutrients, Phosphorus, Nitrogen, Nitrogen compounds, Phosphorus compounds, Microorganisms, Equipment.
Identifiers: *USSR, Aerators, Multistage processes.

A modified three-stage activated sludge process is outlined, which avoids most of the disadvantages of conventional biological effluent treatment systems. Partial removal of oxidized pollutants in first-stage equalizers is followed by high-rate oxidation (2000-3000 g/cu m/day) in a second stage equipped with mechanical aerators which remove 70-80% of the BOD load at a BOD:N:P nutrient ratio of 100:4:1. Final 'profound' (in-depth) treatment with specific microfloral cultures occurs in third-stage high-load aeration ponds equipped with self-suction type aerators. (See also W74-12400) (Brown-IPC)
W74-12428

A PILOT PLANT STUDY FOR THE TREATMENT OF PAPERMILL AND DEINKING EFFLUENTS,
American-Israeli Paper Mills Ltd., Hadera (Israel).
L. Rakosh.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 769-780, 1973. 5 fig, 5 tab, 2 ref.

Descriptors: Treatment facilities, *Pilot plants, *Waste water treatment, *Pulp wastes, *Waste treatment, Pulp and paper industry, *Water reuse, Water conservation, Recirculated water, Irrigation, Flocculation, Activated sludge, Suspended solids, Turbidity, Industrial water, Biochemical oxygen demand, Biodegradation, Organic loading, Recycling, Discharge(Water), Waste water(Pollution), Sedimentation.
Identifiers: White water, *Israel, De-Inking wastes, Waste paper, Attisholz process, Paper machines, Paper mills.

An Israeli paper mill which, until recently, discharged its untreated effluent into a local stream, has installed a new treatment facility comprising primary sedimentation followed by two-stage activated sludge treatment in an Attisholz (Swiss-developed) pilot unit which handles the combined white waters from two paper machines producing offset printing, kraft wrapping, and newsprint papers. At volumetric loadings of 3-4 kg of BOD per day per cu m of aeration volume, low turbidities (suspended solids) were achieved with some flocculant addition to the second stage. Without biological treatment, 7 to 20 times as much flocculant would have been needed. At higher pollution loads of 6-8 kg BOD, the same turbidities were obtained without flocculants. Deinking effluent (from waste paper deinking) was readily biodegradable. The process responded well to frequent changes in water composition resulting from paper grade changes, and to variations in pollution load. The treated effluent could be recirculated or disposed of as irrigation water. (See also W74-12400) (Brown-IPC)
W74-12429

RECENT DEVELOPMENTS IN PAPER MILL EFFLUENT TREATMENT IN FRANCE (DEVELOPPEMENTS RECENTS DU TRAITEMENT DES EFFLUENTS DE PAPETERIE EN FRANCE),
Societe Degremont, Paris (France).
P. Treille.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 781-796, 1973. 9 fig, 3 tab.

Descriptors: *Pulp wastes, *Waste water treatment, *Waste treatment, *Treatment facilities, Equipment, Europe, Pulp and paper industry, Effluents, Flotation, Flocculation, Turbulent flow, Electric fields.
Identifiers: *France.

Illustrated descriptions and examples of practical applications in the paper industry are given for three effluent-treatment units marketed by the French Societe Degremont, viz., a 'turbocirculator,' a 'flotator', and an 'electro-flocculator'. (See also W74-12400) (Brown-IPC)
W74-12430

AN INTERESTING METHOD OF ABATING POLLUTION IN THE PULP AND PAPER INDUSTRY,
Ecolgenova, S.p.A., Genoa (Italy).
G. Mortola.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 797-803, 1973. 4 fig, 1 tab.

Descriptors: Treatment facilities, Equipment, *Pulp wastes, *Sedimentation, *Coagulation, *Suspended solids, *Filtration, *Sludge, Nitrogen compounds, Phosphorus compounds, Pulp and paper industry, Waste water treatment, Waste treatment, Activated sludge, Separation techniques.
Identifiers: *Seclar(Clarifier).

The operation and practical application to a paper mill effluent of the Seclar sedimentation-coagulation unit are described and illustrated. The clarifier separated suspended solids by upward filtration through a floating blanket of sludge. The unit can be used as primary or secondary settling tank in activated sludge processes. It is suited also for removal of N and P compounds. (See also W74-12400) (Brown-IPC)
W74-12431

METHOD FOR TREATING OIL-CONTAINING WASTES,
M. Ohta.
U.S. Patent No 3,809,631, 2 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 922, No 1, p 274-275, May 7, 1974.

Descriptors: *Patents, *Industrial wastes, *Oil wastes, *Electrolysis, *Pollution abatement, Water quality control, Water pollution control, *Waste water treatment, Oily water.

Industrial wastes containing oils and surfactants are treated by adjusting the pH of a waste to 3 or less. The waste is then subjected to electrolytic treatment wherein the oil phase is separated out. In the first-stage electrolytic treatment a titanium-lead oxide composite electrode is employed as an acid-resistant anode. The remaining waste water is again subjected to electrolysis. This time the electrodes are composed of aluminum thereby precipitating the surfactants as sludge separated from water. (Sinha-OEIS)
W74-12433

PROCESS FOR REMOVING CHROMIUM FROM COOLING TOWER BLOWDOWN STREAMS,
Texas Gulf, Inc., New York.
A. Gloster, and H. G. Boockino.
U.S. Patent No 3,810,542, 4 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 922, No 2, p 522, May 14, 1974.

Descriptors: *Patents, Pollution abatement, *Cooling towers, *Chromium, *Industrial wastes, *Waste water treatment, Water pollution control, Water quality control, Acid streams.
Identifiers: Chemical treatment.

A procedure for combining the streams from a cooling tower and an acid plant scrubbing tower to reduce the pollution problems of these industrial waste water is disclosed. The cooling tower stream is characterized by the presence of chromium products in which the chromium is in the hexavalent state, such as chromic acid or a chromate salt which are common corrosion inhibitors in cooling waters. The acid plant scrubbing tower has an acidic component such as sulphur dioxide dissolved in water. By combining these two streams the hexavalent chromium under acidic conditions is converted to trivalent chromium. The combined streams are then neutralized to precipitate chromium hydroxide and other compounds which are undesirable in the effluent. After settling out the chromium hydroxide and other compounds the waste stream may be discharged without presenting a pollution problem. (Sinha-OEIS)
W74-12434

MOBILE PURIFYING PLANT FOR WASTE WATER,
Aktiebolaget Gustavsbergs Fabriker (Sweden). (assignee).
B. O. Lundqvist.
U.S. Patent No 3,810,543, 3 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 922, No 2, p 522, May 14, 1974.

Descriptors: *Patents, *Waste water treatment, *Biological treatment, Pollution abatement, Water pollution control, Water quality control, *Water purification, Aluminum sulphate, Separation techniques.

A purifying plant for waste water consists of a mobile housing of a size to be transported on public highways. The housing contains means for the biological purification of the waste water, means for mixing aluminum sulphate into the biologically purified water, a separator to separate the deposited particles from the water, and a tank to collect the particles separated in the separator. The various apparatuses are situated at one wall of the housing, so as to create a compact plant. (Sinha-OEIS)
W74-12435

ELECTROLYTIC FLOTATION,
Simon-Hartley Ltd., Stoke-on-Trent (England).
E. P. Austin.
U.S. Patent No 3,817,865, 2 p, 8 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 1068, June 18, 1974.

Descriptors: *Patents, *Flotation, *Electrolysis, *Activated sludge, *Waste water treatment, Pollution abatement, Water pollution control, Electrodes, Gases, Bubbles, Equipment, Effluent.

In the flotation apparatus, the liquid to be treated is caused to flow through a tank equipped with at

least one electrode assembly. Gas bubbles are generated by electrolytic action. The gas bubbles cause suspended matter to rise to the surface of the tank to be skimmed off for removal. The removal device comprises endless chains supported on sprocket wheels at opposite sides of the tank. The chains are driven so that scraper blades remove the thickened material for disposal into a suitable waste collector. (Sinha-OEIS)
W74-12439

METHOD FOR TREATING WASTE WATERS,
Fried-Krupp G.m.b.H., Essen (West Germany).
B. Hoke.
U.S. Patent No 3,817,862, 4 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 1068, June 18, 1974.

Descriptors: *Patents, *Filtration, *Waste water treatment, *Organic wastes, *Aeration, *Chemical oxygen demand, Pollution abatement, Water quality control, Water pollution control, Activated carbon, Ion exchange, Carbon.

Waste water containing emulsified and dissolved, oxidizable, organic substances is added to a catalyst selected from a group consisting of carbon and ion exchangers. Air is forced through the resulting mixture, increasing the interfacial area between them. The treatment is discontinued when the chemical oxygen demand and permanganate consumption values have been reduced. The treated mixture is then filtered through a bed of activated carbon. (Sinha-OEIS)
W74-12440

METHOD OF COAGULATING SUSPENDED SOLID IMPURITIES IN WATER WITH SILICONE-SILICA COMPOSITIONS,
G. M. J. Slusarczuk, and J. F. Brown, Jr.
U.S. Patent No. 3,817,861, 10 p, 8 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 1068, June 18, 1974.

Descriptors: *Patents, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, *Flocculation, Electrolytes, Suspended solids, *Coagulation.
Identifiers: Silicic acid, Silane, Silicone, Biocolloids.

Water-dispersed compositions have been prepared by contacting 'soluble silica' with a hydrolyzed carbon-functional silance. The macromolecular structure present in this composition may consist of silicic acid polymer molecules, the outer surfaces of which are partially covered with cationic silicone molecules attached thereto. One specific system that has been found to produce very effective flocculants, particularly for the removal of biocolloids from wastewater, is produced by the reaction between a silicic acid sol and an aminofunctional aliphatic silane. The flocculative effectiveness of the silicic acid polymer molecules so modified can be explained on the basis of the probable manifestation thereby both of the mechanism of attachment characteristic of silica sol and of the mechanism of attachment characteristic of cationic polyelectrolytes. (Sinha-OEIS)
W74-12441

METHOD OF DISINFECTING WATER AND DEMAND BACTERICIDE FOR USE THEREIN,
Kansas State Univ., Research Foundation, Manhattan.
For primary bibliographic entry see Field 5F.
W74-12442

WASTE WATER TREATMENT METHOD,
Texaco, Inc., New York.
J. F. Tate.
U.S. Patent No. 3,817,859, 3 p, 3 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 1067, June 18, 1974.

Descriptors: *Patents, Chemical reactions, *Liquid wastes, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, Acidity, Sulfides, Alkaline earth metals, Metals, Alkaline water, Hydrogen ion concentration.
Identifiers: *Pollution prevention, Cresylates, Iron salts.

In the case where two streams of waste water are alkaline and are capable of forming a solid precipitate upon contact with each other, the pH is lowered to an acidic range to inhibit the formation of a precipitate or to dissolve any precipitate already formed. The waste in the original streams might be in the category of sulfides, cresylates and soluble iron salts and alkaline earth metal ions. The acid recommended is hydrochloric acid. (Sinha-OEIS)
W74-12443

AEROBIC SEWAGE TREATMENT SYSTEM,
Coate Burial Vault, Inc., West Milton, Ohio.
K. J. Yost.
U.S. Patent No. 3,817,858, 5 p, 8 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 1067, June 18, 1974.

Descriptors: *Patents, *Liquid wastes, *Sewage treatment, *Aerobic treatment, *Chlorination, *Waste water treatment, Water treatment, Pollution abatement, Water pollution control, Water quality control, Equipment.
Identifiers: *Water clarification.

Liquid sewage is directed generally tangentially into a large, flat and shallow aerobic settlement tank to expose a large surface area of the sewage per unit volume. Air is circulated over the surface of the sewage in a spiral direction to effect circulation or turbulence of the sewage within the tank and diffusion of the air into the liquid. The air flow within the tank is produced by connecting the air outlet of the tank to a chimney which projects upward adjacent to the outer wall of the residence and creates a natural draft. The liquid treated in the aerobic settlement tank is directed into a similarly shaped aerobic digestor and clarifier tank which also provides for circulation of the treated liquid and diffusion of the air in response to a generally spiral flow of air also created by the chimney draft. The second tank defines an annular clarifier chamber which receives the treated liquid before it is discharged. The discharged effluent may be directed through a chlorinator formed by a vertical housing which receives a supply of chlorine crystals. The crystals are urged downward into the path of the effluent by a combined weight and valve which is effective to stop the flow of treated liquid in the event additional chlorine crystals are not added to the supply. (Sinha-OEIS)
W74-12444

TREATMENT OF WASTEWATER,
Autotrol Corp., Milwaukee, Wis.
W. N. Torpey.
U.S. Patent No. 3,817,857, 5 p, 7 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 1066, June 18, 1974.

Descriptors: *Patents, *Waste water treatment, *Biological treatment, *Oxidation, *Denitrification, *Pollution abatement, Water pollution control, Water quality control, Equipment.
Identifiers: *Activated slime, Nitrogenous wastes, Carbonaceous wastes.

Wastewater is treated by the use of a mixture of biologically activated slimes attached to partially submerged rotating contractors, in order to accomplish the oxidation of carbonaceous and nitrogenous matter. The contractors are mounted in a single-stage treatment unit. They are supplied with wastewater at a controlled rate relative to the surface of the contractors and are distributed evenly over the surface of the contractors. A denitrifying unit is supplied with wastewater and recirculated effluent from the single-stage treatment unit. The denitrifying unit utilizes biologically active slimes attached to rotating biological contractors for the removal of carbonaceous matter from the wastewater supported by nitrate oxygen from the recirculated effluent. (Sinha-OEIS)
W74-12445

APPARATUS FOR REMOVING PARTICULATE MATTER,
B. Michel, and A. A. Delaney.
U.S. Patent No. 3,817,383, 7 p, 8 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 950, June 18, 1974.

Descriptors: *Patents, *Water treatment, *Waste water treatment, Hydraulics, Water quality control, Water pollution control, *Pollution abatement, Equipment, Separation techniques.

The device is intended to remove trash, ice particles or other suspended materials through hydraulically created forces. The structure is provided with a passage such that three stratum or layers of the liquid are formed. A splitting means is placed in the passageway permitting the first strata to flow out of one discharge area, the second and third through separate discharge areas. The device is either partially or totally submergible in water. The shape of the passageway generates a stream velocity which permits formation of an upper strata carrying flotable particulate matter, and a lower strata which contains and carries settable matter. The splitter separates these so that the intermediate 'cleaned' strata are discharged to the site to be utilized. (Sinha-OEIS)
W74-12447

METHOD FOR THE TREATMENT OF WATER,
Mitsui Mining and Smelting Co. Ltd., Tokyo (Japan).
M. Ichiki, and K. Nakade.
U.S. Patent No. 3,816,276, 3 p, 6 ref; Official Gazette of the United States Patent Office, Vol 923, No 2, p 673, June 11, 1974.

Descriptors: *Patents, *Pollution abatement, *Electrolysis, *Waste water treatment, Water pollution control, Water quality control, Metals, Oily wastes, Suspended solids, Flotation.

The method involves three processes to remove metal ions, oils or suspended solids. In the first process water is electrolyzed in an electrolytic cell with an anode of aluminum or aluminum alloy while blowing air into the water so the insoluble compounds are formed. In the second, anionic water-soluble high molecular materials are added to the water so that the compounds are converted into coagulums which float on the surface. Water remaining from the second process is electrolyzed in a second electrolytic cell provided with an insoluble anode so that all the coagulums are floated to the surface for removal. (Sinha-OEIS)
W74-12448

REMOVAL OF DISSOLVED OR SUSPENDED SOLIDS IN WASTE WATER,
Swift and Co., Chicago, Ill.
H. T. Anderson.
U.S. Patent No. 3,816,274, 5 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 923, No 2, p 673, June 11, 1974.

Descriptors: *Patents, *Emulsions, *Waste water treatment, *Oily wastes, *Waste water treatment, Pollution abatement, Water polution control, Water quality control, Suspended solids, Flotation, Chemical reactions, Hydrogen ion concentration.
Identifiers: Anolyte.

Greasy matter is separated by conveying an emulsified water fat solution to a first zone of a container where the walls act as a cathode. Anodes are placed transverse to the entry flow of the solution. The pH changes at least 2 units conveying the solution to a second zone having anodes positioned so that the lowest potential is greater than 0.6 volts but not more than 3 volts and impressing electrical current throught the solution forming a three dimensional anolyte body of solution. The fat particles separate from the water and float to the surface for removal. (Sinha-OEIS)
W74-12449

ARRANGEMENT FOR CONTINUOUS TREATMENT OF POLLUTED LIQUIDS,
Ceskoslovenska Akademie Ved, Prague.
S. ,Mackrle, and V. Mackrle.
U.S. Patent No. 3,815,750, 7 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 923, No 2, p 550, June 11, 1974.

Descriptors: *Patents, *Flocculation, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, Equipment, Sludges, Sedimentation, Filtration.
Identifiers: *Bioflocculation.

An arrangement for the continuous treatment of polluted liquids by a bioflocculation process comprises a bioflocculation space and a chamber having a perfectly fluidized sludge blanket situated above the bioflocculation space. The bioflocculation space is enclosed in at least two connected vessels of cylindrical shape having outer mantles with a horizontal axis, aligned side by side, the bottom of the chamber having the perfectly fluidized sludge blanket being formed at least partly by the mantles of the bioflocculation vessels. Means for supplying oxydation gas into the bioflocculation space and means for promoting a helical and circulating motion in the vessels forming the bioflocculation space are provided. Polluted liquid is converted to a suspension. A sedimentation channel is inclined with respect to a vertical line and the adjacent bioflocculation space. (Sinha-OEIS)
W74-12452

TREATMENT OF SEWAGE OR CONTAMINATED WATER,
Albright and Wilson Ltd., Oldbury, (England).
D. A. Swales.
U.S. Patent No. 3,814,686, 3 p, 4 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 923, No 1, p 264, June 4, 1974.

Descriptors: *Patents, *Sewage treatment, *Coagulation, *Industrial wastes, *Waste water treatment, *Water pollution treatment, Iron, Aluminum, Magnesium, Chromium, Chemical precipitation, Treatment.
Identifiers: Chrome residue, Metal salts.

A method is disclosed for removing suspended solids from contaminated water by adding a coagulant. The coagulant is prepared by digesting chrome residue containing 35-40% by weight of Fe203, 27-32% A1203, 13-18% MgO, and 12-17% Cr203 with a strong mineral acid selected from the group consisting of 20-36% by weight hydrochloric acid and 20-100% by weight sulphuric acid to form a solution of metal salts, the solution containing trivalent iron, aluminum, and chromium ions, and magnesium ions. (Sinha-OEIS)
W74-12454

AERATION APPARATUS,
Envirotech Corp., Salt Lake City, Utah.
D. Di Gregorio, and G. L. Shell.
U.S. Patent No. 3,814,396, 4 p, 3 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 923, No 1, p 193, June 4, 1974.

Descriptors: *Patents, *Waste water treatment, *Aeration, Pollution abatement, Water pollution control, Water quality control, Bubbles, Equipment.

The apparatus comprises a non-impelling bubble shearing mechanism secured to and rotatable with the submerged end of a vertical shaft. An axial flow impeller is fixed to the shaft above the shearing mechanism to rotate with it. The impeller drives liquid downward past the shearing mechanism to intersect and entrain the sheared bubbles. This provides increased retention of the mixture in the lower portion of the liquid, and additional contact between sheared bubbles and recirculating liquid before the bubbles rise to the liquid surface. The shearing mechanism includes a hollow cylinder having an open bottom to receive bubbles, a closed top concentrically secured to a rotating shaft, and a slotted sidewall through which the bubbles are released and sheared. (Sinha-OEIS)
W74-12456

REVERSE OSMOSIS FOR MUNICIPAL WATER SUPPLY,
Du Pont de Nemours (E.I.) and Co., Inc., Wilmington, Del.
C. P. Shields.
Water and Sewage Works, Vol 119, No 1, p 64-70, January, 1972. 7 fig, 2 tab.

Descriptors: *Reverse osmosis, *Municipal water, *Desalination processes, *Water treatment, Ions, Water quality, Waste water treatment, *Water supply.

Reverse osmosis is the newest water treatment process in a decade and provides an important tool for improving water quality and utilizing previously untapped sources of water. The principal applications for reverse osmosis are in the desalting of brackish water having total dissolved solids between 1,000 and 15,000 mg/l. Minerals removed include Fe, Ca, Mg, Na, K, bicarbonate, chloride, sulfate and fluoride. RO is a membrane process that acts as a molecular filter to remove up to 90-95 percent of all dissolved organics, and 98+ percent of biological and colloidal matter. The most important capability for municipal water treatment is reduction of the excess dissolved solids. Reverse osmosis costs have now reached the point where desalting is justified for communities currently using poor quality water and is competitive with conventional means of acquiring additional supply. (Jernigan-Vanderbilt)
W74-12513

FILTRATION OF OILFIELD PRODUCED WATERS,
J. T. Wallace.
Society of Petroleum Engineers of AIME Preprint SPE 4251, 1972. 6 p, 7 fig.

Descriptors: *Filtration, *Waste water treatment, Water purification, Water quality control, *Well filters, Water pollution, *Groundwater, Oil wastes, Oily water, Brine disposal, *California.
Identifiers: *Long Beach(Calif), Contamination, *Permanent media pressure filters, Automatic backwash system.

The city of Long Beach, California was recently awarded first prize in a national environmental competition for pioneering a program of getting the various field operators to build filtration systems to handle produced oil field brinewater, and then to reinject the filtered wastewater back underground, serving the dual purpose of eliminating a potential pollution problem and helping to curb subsidence. The produced water may contain as much as 25 to 50 parts per million of oily residue and an equal quantity of suspended solids, but it is also oxygen deficient. The oily residue and solids have little effect on marine life, but the oxygen deficiency would be detrimental. The application of deep bed dual media filters as the final step before injection made the program economically feasible by removing the majority of the contaminants and making injection into the aquifers a reality. (Campbell-NWWA)
W74-12539

NITRIFICATION AND DENITRIFICATION FACILITIES. WASTEWATER TREATMENT,
Metcalf and Eddy, Inc., Boston, Mass.
C. N. Sawyer, H. E. Wild, Jr., and T. C. McMahon.
Environmental Protection Agency Technology Transfer Seminar Publication, August 1973. 33 p, 24 fig, 3 tab, 13 ref.

Descriptors: *Nitrification, *Denitrification, *Treatment facilties, *Sewage treatment, Biochemical oxygen demand, Nitrates, Nitrogen, Ammonia, Hydrogen ion concentration, Temperature, Kinetics, Design, Settling basins, Sludge, Effluents, Pilot plants.
Identifiers: Nitrogenous oxidation.

Wastewater treatment plants designed to accomplish nitrification and denitrification require a three-stage biological system in climates where wastewater temperatures drop below 18C. The first stage is necessary to remove carbonaceous BOD-5 to levels of about 50 mg/l. The second stage is needed to accomplish nitrification and should be designed to employ the plug-flow principle as closely as possible. The third stage accomplishes denitrification. A source of carbonaceous BOD must be added to reduce the nitrates to nitrogen gas in a reasonable period of time. Studies showed that factors affecting nitrification kinetics are: the ammonia-nitrogen concentration did not inhibit nitrification in concentrations of less than 60 mg/l; pH did not affect the rate of nitrification (optimum 8.4); temperature did not affect the nitrification (rate increased through the range of 5 degrees to 30C); the time required for nitrification is directly proportional to the amount of nitrifiers in the system; instantaneous increases (from 50 to 110 mg/l) or decreases (from 50 to 5 mg/l) in BOD concentration did not affect the rate of nitrification. Design criteria and denitrification by suspended growth systems, are described both based on pilot plant data. (Jones-Wisconsin)
W74-12560

SIMULATION OF THE DIFFUSION OF DISSOLVED SALTS IN AQUIFERS,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 5B.
W74-12594

EVALUATION OF CONCEPTS FOR SEPARATING OIL FROM WATER DISCHARGED FROM SHIPS,
Coast Guard, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 5G.
W74-12642

PHOTOSYNTHETIC RECLAMATION OF AGRICULTURAL SOLID AND LIQUID WASTES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
C. G. Golueke, W. J. Oswald, G. L. Dugan, C. E. Rixford, and S. Scher.
Available from NTIS, Springfield, Va. 22161 as PB-222 454, Price $3.75 printed copy, $2.25 microfiche. Environmental Protection Agency, Ecological Research Series Report EPA-R3-73-031, August 1973. 83 p, 10 fig, 7 tab, 26 ref. EPA Grant No EP-00272.

Descriptors: *Waste disposal, *Farm wastes, *Domestic wastes, *Recycling, *Algae, Water reuse, *Anaerobic digestion, *Waste water treat-

ment, Nutrients, Fermentation, Photosynthesis, Solid wastes, Liquid wastes, Pilot plants, Kinetics.
Identifiers: Anaerobic treatment.

A system with which a large fraction of the wastes produced by agricultural industries could be converted into a useful material without imposing an unacceptable burden on the environment was studied. Specifically, the project involved a detailed study of the basic characteristics of an integrated anaerobic fermentation and algae growth system for agricultural solid and liquid wastes on a laboratory and small pilot plant scale, with special attention devoted to the reaction kinetics of the system. A substantial degree of nutrient recovery and recycle can also be attained in the system. (Knapp-USGS)
W74-12647

SURVEY OF METHODS OF TREATING WINE AND GRAPE WASTEWATERS,
New York State Dept. of Environmental Conservation, Albany.
T. J. Tofflemire.
Am J Enol Vitic. Vol 23, No 4, p 165-172. 1972.

Descriptors: *Industrial wastes, *Waste water treatment, Effluents, *Biological treatment.
Identifiers: Grapes, *Wine.

The waste characteristics and treatment methods for wine and grape wastewaters are discussed. The wastewater is strong and highly variable, and tends to become odorous upon standing. Stillage represents a more concentrated and acidic wastewater that may require neutralization. The P and N content of the wastewater is less than ideal by the 1/30/150 standard. The treatment methods discussed include activated sludge systems, aerated lagoons, trickling filters, rotating biological discs, irrigation systems, anaerobic processes, and chemical processes.--Copyright 1973, Biological Abstracts, Inc.
W74-12676

EXPERIENCE IN SANITARY EVALUATION OF THE USE OF POLYETHYLENE PIPES FOR RURAL WATER SUPPLY LINES, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
V. O. Sheftel, and V. G. Sinitskii.
Gig Sanit. Vol 38, No 3, p 111-113. 1973.

Descriptors: *Water quality, *Effects, Pipelines, Pipes, *Plastic pipes, Plastics.

Under laboratory conditions, low density polyethylene stabilized by C did not have a significant effect on the organoleptic, physicochemical and microbiological indices of water quality. Over 300 analyses of water from 8 water supply lines were carried out over an 8 yr period.--Copyright 1974, Biological Abstracts, Inc.
W74-12716

BIOLOGICAL TREATMENT OF PHOTO PROCESSING EFFLUENTS,
Eastman Kodak Co., Rochester, N.Y.
T. J. Dagon.
J Water Pollut Control Fed. Vol 45, No 10, p 2123-2135, 2239. 1973. Illus.

Descriptors: Wastes, *Industrial wastes, *Chemical wastes, *Discharge(Water), *Effluents, Activated sludge, *Aeration, *Waste water treatment, *Biological treatment.
Identifiers: *Photographic processing wastes.

Photographic processing effluents can be handled effectively by municipal collection and treatment systems. Domestic wastes with up to 20% photographic waste cause no adverse effects on the activated sludge system. Where no municipal facilities are available to a processor, the wastes can be treated in an extended aeration packaged unit. Up to 85% reduction in biochemical oxygen demand (BOD) can be obtained with such units.--Copyright 1974, Biological Abstracts, Inc.
W74-12718

SOIL MICROORGANISM METABOLISM IN SPRAY IRRIGATION,
North Texas State Univ., Denton.
G. R. Vela, and E. R. Eubanks.
J Water Pollut Control Fed. Vol 45, No 8, p 1789-1794. 1973. Illus.

Descriptors: Industrial wastes, *Waste water treatment, Effluents, Canneries, Irrigation systems, Bacteria, Soil bacteria, Metabolism.
Identifiers: *Spray irrigation treatment.

A study of the microbial activities in a spray irrigation treatment system for cannery wastewater showed that there was no enzymatic activity in the process water and that bacteria in the effluent contributed little or nothing to purification. Specific bacterial populations developed in the spray fields. These bacteria hydrolyzed polymers and oxidized monomers in the wastewater. Only 16 of 100 isolated species contributed directly to purification, although the remainder probably contributed indirectly. There was no correlation between total numbers of bacteria and oxidative capacity of the soils in the irrigation field.--Copyright 1974, Biological Abstracts, Inc.
W74-12725

TREATMENT OF OILY WASTES FROM A STEEL MILL,
McMaster Univ., Hamilton (Ontario).
D. R. Woods, and M. W. Slezak.
J Water Pollut Control Fed. Vol 45, No 10, p 2136-2145, 2239, 1973. Illus.

Descriptors: *Waste treatment, Distillation, Mixing, *Oil wastes, *Coagulation, *Solvent extraction, Wastes.

The theory of stability of an oily waste is reviewed. Two laboratory-scale processes are described to treat the waste. In the solvent extraction process, a small amount of electrolyte added to the oily waste feeds to a countercurrent mixer-settler solvent-extraction column. With water phase continuous and at a relatively high rpm for the mixing, good quality effluent could be obtained in 6 stages. The solvent could be recycled. Bench-scale operating conditions were identified. In the coagulation process, suitable coagulants were identified from jar tests. The dosage rates, pH, and oil removal rates found in the batch jar test agreed reasonably well with the results from a carefully scaled-down flow unit.--Copyright 1974, Biological Abstracts, Inc.
W74-12726

5E. Ultimate Disposal Of Wastes

HIGH-RATE LAND TREATMENT II: WATER QUALITY AND ECONOMIC ASPECTS OF THE FLUSHING MEADOWS PROJECT,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W74-12005

DIRECTORY OF MANAGERS, ENGINEERS AND SCIENTISTS IN OCEAN WASTE DISPOSAL AND RELATED ENVIRONMENTAL SCIENCE FIELDS,
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
C. T. Tucker, and R. J. Marmolejo.
Available from NTIS, Springfield, Va. 22161 as PB-224 459, Price $3.50 printed copy; $2.25 microfiche. Contract Report 4460C1543 for Environmental Protection Agency, June 1973. 67 p. EPA Contract 68-01-0796.

Descriptors: *Waste disposal, *Water pollution control, *Personnel, Professional personnel, Scientific personnel, Management.
Identifiers: *Directories.

This directory of managers, engineers, and scientists working in ocean waste disposal is intended to facilitate communiction in the field of ocean waste disposal and related environmental sciences. (Knapp-USGS)
W74-12020

STORAGE OF PLUTONIUM METAL IN SEALED CANS,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 5D.
W74-12046

SOME EXTENSION SERVICE CAPABILITIES,
Georgia Univ., Athens. Cooperative Extension Service.
For primary bibliographic entry see Field 6E.
W74-12172

BRINE DISPOSAL TREATMENT PRACTICES RELATING TO THE OIL PRODUCTION INDUSTRY,
Oklahoma Univ. Research Inst., Norman. School of Civil Engineering and Environmental Science.
For primary bibliographic entry see Field 5D.
W74-12211

WASTE OIL RECYCLING AND DISPOSAL,
Recon Systems, Inc., Princeton, N.J.
For primary bibliographic entry see Field 5D.
W74-12215

ACTIVE PROJECTS, PURE WATERS RESEARCH.
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 10C.
W74-12234

PHOSPHATE REMOVAL BY SANDS AND SOILS,
New York State Dept. of Environmental Conservation, Albany.
T. J. Tofflemire, M. Chen, F. E. Van Alstyne, L. J. Hetling, and D. B. Aulenbach.
December 1973. 72 p, 17 fig, 5 tab, 243 ref.

Descriptors: *Phosphorus compounds, *Phosphorus, *Soil chemical properties, *Soil physical properties, *Waste water disposal, *Pollutants, Soil chemistry, Soil investigations, Pollution abatement, Waste water treatment, Soil surveys, Soil testing.
Identifiers: *Phosphorus removal, *Phosphorus disposal.

An approach is presented for evaluating a land disposal site for phosphorus removed from wastewater. It involves: (1) making a field reconnaissance, (2) gathering literature data on soils, and geology; (3) determining the flow pathway of the wastewater; (4) taking soil samples in that pathway; (5) analyzing the soil samples for particle size distribution, pH and rapid phosphate adsorption capacity; and (6) calculating and adding the capacities of the various soil volumes involved. The land disposal system is then designed so that it does not exceed the phosphate adsorption capacity of the site for the time desired. Further studies should be conducted on long term phosphate mineralization or the site should be rejected as unacceptable. Because the necessary field data is difficult to gather, the approach involves a number

of assumptions and will yield a conservative estimate of the phosphorus removal. For very large treatment systems, column studies, field pilot studies and ground water modeling studies are also recommended. At an operating land disposal site, wells and lysimeters can be installed to measure resulting ground water quality. (Poertner)
W74-12235

THE TREATMENT AND REMOVAL OF WASTE WATER RESIDUAL SLUDGES IN THE PAPER INDUSTRY (DIE BEHANDLUNG UND BESEITIGUNG VON RESTABWASSERSCHLAEMMEN DER PAPIERINDUSTRIE),
Muenchen-Dachauer Papierfabriken Heinrich Nicolaus G.m.b.H. (West Germany).
G. Strittmatter.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 407-418, 1973. 9 fig.

Descriptors: *Sludge, *Pulp wastes, *Dewatering, *Sludge treatment, *Waste disposal, *Ultimate disposal, *Separation techniques, *Recycling, *Solid wastes, Incineration, Landfills, Filtration, Centrifugation, Effluents, Research and development, Marketing.

The separation, thickening (concentration), dewatering (by centrifugation or filtration), reuse, and disposal (by combustion, landfill, etc.) of paper mill effluent sludges are discussed. Although separation and sludge treatment problems are largely solved, the recirculation of white water sedimentation sludge into commercial marketable products, such as flameproof building panels, will require much more research and development work. (See also W74-12400) (Brown-IPC)
W74-12417

FILTRATION OF OILFIELD PRODUCED WATERS,
For primary bibliographic entry see Field 5D.
W74-12539

HYDROLOGY OF RADIOACTIVE-WASTE DISPOSAL AT THE IDAHO CHEMICAL PROCESSING PLANT, NATIONAL REACTOR TESTING STATION, IDAHO,
P. H. Jones.
Geological Survey Research, Article 420, 1961. p D-374-D-376, 2 fig, 1 tab, 1 ref.

Descriptors: *Radiation, *Groundwater, Reservoirs, Basalts, Silts, Gravel, Sand, Brine, Aquifers, Petrology, Hydrology, Water wells, Boreholes, Gamma rays, Waste water(Pollution), Salinity, Water quality, Waste disposal, *Idaho.
Identifiers: National Reservoir Testing Station(Ida), *Radioactive-waste disposal, *Intercept wells, Vertical flow.

Low-level aqueous radioactive waste (less than 10 to the minus 4 microcuries per milliliter, gross beta-gamma) is pumped directly into the groundwater reservoir at the Idaho Chemical Processing Plant (ICPP) through a drilled, cased, gravel-packed well 598 feet deep. This well penetrates several thin basalt flows and a single thin bed of silt, sand, and gravel below the water table, which occurs at a depth of about 460 feet. Radioactive waste is diluted with warm nonradioactive water from plant wastes, including large amounts of sodium-chloride brine from water-softening units. Since 1952, 757 curies of activity have been disposed to this well in 2 1/2 billion gallons of water. Vertical flow between aquifers tapped by intercept wells results in an erratic distribution of waste water in the ground-water reservoir and makes measurements of water level in the well useless for quantitative purposes. Effective study of vertical flow requires reconstruction of intercept wells so that they tap but one aquifer. Where this has been done using modified oilwell packers, head differences between aquifers generally occur in waters from different aquifers tapped by the same well. (Campbell-NWWA)
W74-12546

DISPOSAL OF URANIUM-MILL EFFLUENT NEAR GRANTS, NEW MEXICO,
S. W. West.
Geological Survey Research, Article 421, 1961. p D-376-D-378, 2 fig, 1 tab.

Descriptors: Effluents, Potable water, Aquifers, *Groundwater, Limestones, Mills, Stratigraphy, Alluvium, Basalts, Disposal, Sandstones, Bedding, Injection wells, Faults(Geologic), Fractures, Pressure, *New Mexico.
Identifiers: *Uranium-mill effluents, San Andres limestone, Glorieta sandstone, Evaporation pond.

Disposal of uranium-mill effluent at the Anaconda Co. Bluewater Mill, 9 miles northwest of Grants, N. Mex., became a problem in a relatively short time after the mill was built in 1952. The use of an evaporation pond in a natural depression and much research by The Anaconda Co. on impervious pond linings and on other methods of surface disposal indicated that surface methods of disposal might contaminate the potable ground water. The company then investigated the possibility of injecting the waste fluids into an unused aquifer that contains non-potable water and is below, and isolated from, the principal sources of ground water in the area. There are many faults in the region, and it was feared that fractures in the fault zones might be conduits through which water could move from one formation to another. It seemed possible, also, that permeable beds might be offset against impermeable beds forming barriers to lateral movement of water away from the injection well and causing excessive buildup of hydraulic pressure in the disposal zone. The initial injection test indicated that vertical leakage was negligible and that one or more faults are barriers to lateral movement of the water. Temporary cessation of injection at critical times during the test period obscured the reaction of the water level to the probable barrier. Thus, the future pressure buildup cannot be forecast until more is learned about the effects of the barrier. (Campbell-NWWA)
W74-12552

5F. Water Treatment and Quality Alteration

STUDY RELATING TO THE USE OF A PROCESS CONTROL COMPUTER FOR A WATER TREATMENT PLANT IN FRANCE,
Compagnie Generale des Eaux, Paris (France).
D. Coyaud.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 229-239, 25-27 September 1973. 3 ref.

Descriptors: *Industrial plants, *Management, Computers, Control, *Water treatment, *Treatment facilities, Water quality, Data processing, Investment, Pumping, Ozone, Monitoring, Operating costs, Europe, Statistics.
Identifiers: *Process control, *France, Filter washing, Caustic soda, Raw water, Savings.

The management of modern industrial plants presents many intricate problems difficult to solve. Therefore, computers operating in real time are being used to assist the technical management. The Compagnie Generale des Eaux proposes to install a process control computer in its plant at Neuilly-sur-Marne. The computer will control the pumping and treatment equipment existing on site, and as a second stage it will be extended to structures and networks outside the plant. Discussed are the functions to be initially ensured: (1) supervision of about 160 measurements, 360 status conditions and 230 alarm conditions; (2) data processing yielding information easily usable by staff in charge of plant; (3) issue of reports and statistics; (4) optimized control of sub-assemblies (i.e., pumping program, equal distribution of the flow, best conditions for filter washing, etc); and (5) management of chemical stocks through off-line programs, together with group maintenance schedule, statistics and data analysis. The initial investment and the running costs have been estimated, as well as expected savings. Installations using computers in Europe (Chambrey, France, St. Gall, Switzerland, and Luxemburg dam) are given as examples. (See also W74-12107) (Bell-Cornell)
W74-12119

COMPUTER USE IN US WATER AUTHORITY,
Chicago Dept. of Water and Sewers, Ill.
J. B. Corey.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 241-249, 25-17 September 1973. 2 fig, 1 append.

Descriptors: *Water works, Computers, *Control, Regions, Management, Operation and maintenance, Monitoring, *Water treatment, Treatment facilities, Water quality, Water quantity, Water utilization, Lake Michigan.
Identifiers: *Chicago(Ill), *Process control, *Filtration plants, Reporting, Physical set-up.

The City of Chicago waterworks system is outlined and the extent to which process computer capability is utilized is considered in more detail. The physical set-up is described together with the monitoring and reporting functions of the system. All computer capability is at present located in the Central Water Filtration Plant, the world's largest water treatment plant; an Appendix is included which briefly describes this installation. A typical flow diagram is shown. In conclusion, possible future developments are indicated. (See also W74-12107) (Bell-Cornell)
W74-12120

THE START-UP MODEL OF A RAPID SAND FILTER,
Philips Forschungslaboratorium G.m.b.H., Hamburg (West Germany).
M. Klinck.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England. p 101-104, 25-27 September 1973. 2 fig, 3 equ, 1 ref.

Descriptors: *Water treatment, *Water quality control, *Treatment facilities, *Filters, *Simulation analysis, Effluents, Operation and maintenance, Design, Pipe flow, Control, Model studies, Computers, Systems analysis.
Identifiers: Rapid sand filters, Start-up model, Washing procedure.

Rapid sand filters play a very important role in many water treatment plants. An operation model can be built as the basis for the design of the corresponding level control loop. With this operation model, which describes the static and dynamic behavior, the structure of the level controller can be designed and the parameters can be chosen. During the startup period after a washing procedure, however, the operation model for the rapid sand filters is not valid. Using simulation analysis, a start-up model is derived and the start-up behavior of the level-controlled rapid sand filter is investigated. Use of a simulation language for continuous systems running on a digital computer is advantageous in such investigation. Much money can be saved during the installation and test period of a plant, if use is made of simulation-aided design methods for the control of complete water treatment plants. (See also W74-12107) (Bell-Cornell)
W74-12146

METHOD OF DISINFECTING WATER AND DEMAND BACTERICIDE FOR USE THEREIN,
Kansas State Univ., Research Foundation, Manhattan.
J. L. Lambert, and L. R. Fina.
U.S. Patent No. 3,817,860, 6 p, 3 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 1067, June 18, 1974.

Descriptors: *Patents, *Water purification, *Water treatment, *Disinfection, *Bactericides, Halogens, Iodine, Iodides, Microorganisms, Bacteria, Resins, Anion exchange, Waste water treatment.
Identifiers: *Chemical treatment, Triiodide resins.

A method of treating bacterially contaminated water for direct production of disinfected water ready for use is disclosed. The water is rendered bacterially sterile by passing it through a strongly basic anion exchange resin containing combined triiodide without forming a detectable concentration of iodine in the disinfected water. The triiodide is combined in a stable form with the basic groups of the resin. Although the dissociation of the iodine of the resin-insolubilized triiodide is extremely low, the triiodide resins are highly bactericidal, the triiodide groups reacting on demand with bacteria in water suspensions to kill the bacteria. (Sinha-OEIS)
W74-12442

APPARATUS FOR REMOVING PARTICULATE MATTER,
For primary bibliographic entry see Field 5D.
W74-12447

BIOLOGICAL TREATMENT OF PHOTO PROCESSING EFFLUENTS,
Eastman Kodak Co., Rochester, N.Y.
For primary bibliographic entry see Field 5D.
W74-12718

EPIDEMIOLOGICAL ASPECTS OF THE PROBLEM OF SANITARY PROTECTION OF BODIES OF WATER, (IN RUSSIAN),
For primary bibliographic entry see Field 5G.
W74-12748

5G. Water Quality Control

RPC DIVISION, MIDLAND-ROSS CORP. 10-GALLON-PER-MINUTE LIQUID/LIQUID SEPARATOR,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va. Fuels Handling Equipment Div.
E. C. Russell.
Available from NTIS, Springfield, Va. 22161 as AD-763 154. Price $3.00 printed copy; $2.25 microfiche. Report 2058, May 1973. 11 p, 2 fig, 3 tab. MIPR-Z-70099-1-13218.

Descriptors: *Separation techniques, *Oily water, *Ships, *Water pollution control, Waste water treatment, Equipment, Evaluation, Water pollution treatment.

A 10-gpm liquid/liquid separator was tested to determine its suitability as a shipboard oil pollution control device. The separator is more effective with coalescer elements installed in all three stages. Redesign of the vessel may be required, however, to enhance complete separation and removal of coalesced oil at high oil injection rates. The high pressure drop across the test unit at the increased flow rate and the test unit weight-to-capacity ratio are excessive. The separator is a two-stage (later converted to three stages by the manufacturer) coalescence-type device. (Knapp-USGS)
W74-12009

DIRECTORY OF MANAGERS, ENGINEERS AND SCIENTISTS IN OCEAN WASTE DISPOSAL AND RELATED ENVIRONMENTAL SCIENCE FIELDS,
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5E.
W74-12020

LEAK DETECTION IN UNDERWATER OIL PIPELINES,
National Maritime Research Center, Galveston, Tex. Cargo Handling and Terminals Program.
For primary bibliographic entry see Field 5A.
W74-12065

BAILEY OIL CONTENT MONITOR,
Esso Research and Engineering Co., Floram Park, N.J.
For primary bibliographic entry see Field 5A.
W74-12066

EFFLUENT MANAGEMENT INFORMATION SYSTEM (EMIS),
Development Sciences, Inc., East Sandwich, Mass.
M. Gorden, and M. Gorden.
Available from NTIS, Springfield, Va 22161 as PB-221 890 Price $5.45 printed copy; $2.25 microfiche. Contract Report, July 1972. 127 p. NSF Grant C-673.

Descriptors: *Information exchange, *Pollution abatement, *Planning, Data collections, Publications, Ecology, Information retrieval, Data storage and retrieval, Systems analysis.
Identifiers: *Information systems.

The Effluent Management Information System deals with generating new alternatives to pollution abatement, disseminating known techniques, and providing a systematic framework for evaluating the quantitative potential of industrial response to government policy. It identifies alternatives through a materials flow analysis which links firms to find compatible solutions to pollution control. Incorporating economic criteria of increasing productivity from efficient waste management, and applying ecological criteria, the Effluent Management Information System identifies firms within and among 8-industries which could benefit from resource recovery, shared capital investment in treatment centers, and land assimilable waste. A man-machine combination adds known solutions and new alternatives to facilitate dissemination of choices to government policymakers and industry. The system can also indicate in what specific regions a range of solutions is possible, thus giving planners insight into present possible responses and future planning alternatives. The system is also linked to a land use planning tool for siting of new industry. Through the application of these management tools, the conflict between economic growth and environmental quality can be minimized. (Knapp-USGS)
W74-12082

WATER QUALITY CONSIDERATION FOR THE METAL MINING INDUSTRY IN THE PACIFIC NORTHWEST,
Environmental Protection Agency, Seattle, Wash.
J. E. Sceva.
Available from NTIS, Springfield, Va 22161 as PB-226 995 Price $7.75 printed copy; $2.25 microfiche. Environmental Protection Agency Report No Region X-3, 1973. 89 p, 1 fig, 4 tab, 12 ref, 3 append.

Descriptors: *Mining, *Mine wastes, *Water pollution control, Mine acids, Mine water, Acid mine water, Spoil banks, Waste dumps, Water pollution sources, Legislation, Water law, *Water quality standards.

The principal causes of water pollution at both active and abandoned mines are discussed. Recommendations are given for minimizing the effects of mining on water quality. The 1972 Federal Water Pollution Control Act contains many provisions that relate directly with mining operations. It establishes a national goal of eliminating the discharge of pollutants into the waters of the United States by 1985. Interim goals call for the application of best practicable control technology by 1977 and the best available technology by 1983. The FWPCA also requires the states to establish water quality standards for all surface waters. These standards describe water quality conditions that are acceptable to the states and Federal government. The standards for turbidity, suspended solids and heavy metals will have a direct effect on mining operations. (Knapp-USGS)
W74-12085

REAERATION IN OPEN-CHANNEL FLOW,
Canada Centre for Inland Waters, Burlington (Ontario).
Y. L. Lau.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 257-272, 1973. 3 fig, 1 tab, 13 ref.

Descriptors: *Reaeration, *Oxygenation, Self-purification, Water quality, Reviews, Dimensional analysis, Regression analysis, *Open channel flow.

Theoretical models of the mechanism of oxygen absorption are reviewed; they are deficient as far as prediction of the reaeration rate is concerned. Empirical prediction equations resulting from regression analysis of laboratory or field data are applicable over only small ranges of flow conditions. The governing parameters in the process of reaeration in open-channel flow were identified through use of dimensional analysis. The discrepancy which has been suggested to exist between some sets of flume data was actually the result of the method of analysis. A new prediction equation is proposed. (See also W74-12087) (Knapp-USGS)
W74-12099

CONTROL OF SEA WATER INTRUSION BY SALTWATER PUMPING--A MATHEMATICAL MODEL,
MacLaren (James F.) Willowdale (Ontario).
A. F. Ashamalla, and P. L. Hall.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 337-354, 1973. 4 fig, 9 ref.

Descriptors: *Saline water intrusion, *Drawdown, *Aquifers, *Groundwater movement, Pumping, *Mathematical models, *Canada, Withdrawal, Simulation analysis, Saline water barriers.
Identifiers: *Shippegan(NB-Canada).

A mathematical model was built to simulate the effect of pumping on saltwater intrusion in coastal aquifers. The model calculates the motion of a shallow interface in either a phreatic or confined aquifer of varying thickness and properties. Any pattern of recharge by natural replenishment or discharge by pumping at different locations can be simulated. An implicit scheme is used for the solution of the partial differential equations, with changeable size and time increment. The model was used for the solution of an intrusion problem at Shippegan, New Brunswick. The movement of the saltwater wedge along various profiles was computed in response to freshwater pumping. In order to control the intrusion, a saltwater well was located in the model at different locations, and the movement of the saltwater wedge was predicted for different pumping rates. The best locations and pumping rates for the saltwater wells were found

for the prevailing natural boundary conditions and the required water demand. (See also W74-12087) (Knapp-USGS)
W74-12102

COMPUTER USES IN WATER SYSTEMS: CONFERENCE REPORT.
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 6A.
W74-12107

STORET-THE EPA WATER QUALITY DATA SYSTEM,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6A.
W74-12108

COMPUTER SERVICES AND APPLICATION IN THE GREATER LONDON COUNCIL'S DEPARTMENT OF PUBLIC HEALTH ENGINEERING,
Greater London Council (England). Dept. of Public Health Engineering.
A. R. Bovington, and E. L. Patient.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 10-19, 25-27 September 1973. 1 fig.

Descriptors: Computers, *Water resources, *Public health, Engineering, *Computer programs, Rivers, *Water pollution control, Flood control, Treatment facilities, Sewers, Management, Operations, Economics, Public utilities.
Identifiers: *Centralized computing, *London(Eng-UK).

The computing facilities used by the GLC's Department of Public Health Engineering, more than half of which will be involved in water reorganizztion, are described. Discussed are: the main installation, which is the responsibility of the Computer Branch of the Treasurer's Department; other installations, operating specialized computing equipment; Bureau facilities; and software support. Some of the major computer applications and proposed developments are described. Considered are: centralized management applications, including, among others, an accounting scheme, a trade effluents scheme, and a sophisticated stock control scheme; and technical applications, including river surface profile analysis, a sewer model, analysis of data logger output, simulation of refuse transfer stations, and analysis of treatment works operating data. Some proposed developments are a complete personnel information and retrieval system and a data base for sewer operation and management. The paper concludes with a discussion of the effectiveness of centralized computing in a large authority. (See also W74-12107) (Bell-Cornell)
W74-12129

FISH NUTRITION IN THE COOLER RESERVOIR OF THE LITHUANIAN ELECTRIC POWER STATION, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Institut Zoologii i Parazitologii.
L. A. Rachunas.
Gidrobiol Zh. Vol 9, No 5, p 21-27, Illus, 1973. English summary.
Identifiers: Electric powerplants, *Fish growth, *Heated water, Nutrition, Reservoirs, *Sewage, *USSR(Lithuania), Growth rate.

Heated water sewage has no harmful effects on the fodder base of fishes. It contributes to nutritional reserves formation in the winter period, providing fishes with food in other seasons. Some differences are found in food organism composition between heated and unheated zones. In the heated zone fishes feed actively all the year round, they show comparatively high growth rate and are characterized by fatness.--Copyright 1974, Biological Abstracts, Inc.
W74-12164

BIOLOGICAL METHODS FOR THE ASSESSMENT OF WATER QUALITY (SYMPOSIUM PRESENTED AT THE 75TH ANNUAL MEETING, AMERICAN SOCIETY FOR TESTING AND MATERIALS, LOS ANGELES, CALIF., 26-29 JUNE 1972).
American Society for Testing and Materials, Philadelphia, Pa.
For primary bibliographic entry see Field 5A.
W74-12174

INTERACTION OF ENGINEERS AND BIOLOGISTS IN WATER QUALITY MANAGEMENT,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
W. W. Eckenfelder, Jr.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., Special Technical Publication 528, p 3-5.

Descriptors: Education, *Coordination, *Engineering education, Biology, *Scientific personnel, *Water quality, *Water management(Applied), Aquatic life, Professional personnel.

The need for closer interaction between biologists and engineers in order to meet requirements for preservation of aquatic environments is discussed and illustrated, including a review of interdisciplinary academic programs and use of the technical literature. (See also W74-12174) (Brown-IPC)
W74-12175

MIXING ZONE CONCEPTS,
National Academy of Sciences, Washington, D.C. Environmental Studies Board.
C. M. Fetterolf, Jr.
In: Biological Methods for the Assessment of Water Quality, 1973, Philadelphia, Pa., ASTM Special Technical Publication 528, p 31-45. 3 tab, 7 ref.

Descriptors: Aquatic life, *Mixing, Discharge(Water), *Water pollution, *Regulation, *Water quality control, Water management(Applied), *Waste water(Pollution), Standards, Specifications, Waste water disposal, Pollution abatement, Thermal pollution, *Water quality standards, Legal aspects, State governments, Mixolimnion, Effluents.
Identifiers: Aquatic biology, Assimilation, Mixing zones, Time exposure history, Thermal discharges.

There is no uniform approach among states to the designation of zones to accommodate liquid waste discharges into an aquatic receiving system without interfering with other beneficial uses. This leads to confusion and indecision among dischargers and enforcement agencies. Acceptance of universally adaptable guidelines would initiate understanding and progress. Such conceptual guidelines are proposed, including: initial establishment of the waste capacity of the receiving system; control of mass emission rate of critical materials; adoption of aesthetic criteria; establishment of water quality requirements in the mixing zone based on time exposure history; derivation of specialized criteria to permit overlapping mixing zones; assessment of damage to biota on a population basis; recognition that limited loss of living area may not be significant to populations; early acknowledgment that siting and discharge design can afford protection to uses; and that a case-by-case approach is essential to wise use of natural resources, even though it is more difficult than other ways of controlling mixing zones. (See also W74-12174) (Brown-IPC)
W74-12177

BIOLOGICAL MONITORING OF THE AQUATIC ENVIRONMENT,
Environmental Protection Agency, Cincinnati, Ohio. Analytical Quality Control Lab.
For primary bibliographic entry see Field 5A.
W74-12178

USE OF TOXICITY TESTS WITH FISH IN WATER POLLUTION CONTROL,
Newtown Fish Toxicology Lab. National Water Quality Lab., Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W74-12185

ECONOMIC EFFECTS OF SUBSIDIES FOR WASTE ABATEMENT,
Clemson Univ., S.C. Dept. of Economics.
H. H. Macaulay.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 800, $4.50 in paper copy, $2.25 in microfiche. South Carolina Water Resources Research Institute Report No 43, Clemson, 115 p, 4 fig, 2 tables, 2 append, 40 ref, 1974. OWRT B-030-SC(6).

Descriptors: *Taxes, *Costs, Economics, Resources, Financing, Economic Efficiency, Cost allocation, Benefits, Investment, *Pollution abatement, *Pollution taxes(Charges), *Water quality control.
Identifiers: *Subsidies, *Charges, Externalities.

Environmental problems basically involve the use of environment by people and firms whose uses are often mutually exclusive. This approach has not been clearly seen because of an emphasis on (a) pollution rather than use of the environment, (b) compensation of victims of pollution instead of owners or the environment, (c) the public-good nature of the environment instead of its private-good aspects, and (c) technological externalities instead of pecuniary externalities created by other users. The asset-use approach supports user charges, while the case for subsidies must rest not on economic grounds but on equity or political grounds. However, both states and the Federal government grant to industries and municipalities. The value of the tax preferences given to industry has been insignificant relative to the expenditures required for pollution abatement, while those given to municipalities are now about $4 to $5 billion annually. Each of these subsidies fails to discourage the creation of waste and encourages capital intensive waste treatment. The largest subsidies are those provided by regulations requiring firms and municipalities to treat wastes so that those who want clean water may enjoy it. These subsidies appear to be between $3 and $10 billion annually and apparently produce benefits of much less value than the sums spent.
W74-12199

STUDIES ON THE EFFECTS OF SEWAGE EFFLUENT ON SELECTED GROUPS OF ARTHROPODS AND PHYTOPATHIC NEMATODES.
Michigan State Univ., East Lansing. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W74-12202

RECLAMATION OF WATER FOR REUSE IN CHANNEL CATFISH RACEWAY SYSTEMS,
Memphis State Univ., Tenn. Dept. of Biology.
B. A. Simco.
Available from National Technical Information Service, Springfield, Va 22161 as PB-235 824, $3.25 in paper copy; $2.25 in microfiche. Tennessee Water Resources Research Center, Knoxville, Research Report 39, August 1974, 29 p, 2 tab, 6 fig, 26 ref. OWRT B-028-Tenn(1), 14-31-0001-4127.

Descriptors: *Channel catfish, *Fish management, *Recirculated water, *Water reuse, *Filters, *Fish farming, Fish hatcheries, Production.

Identifiers: Fish cultures.

Channel catfish can be cultured at high densities in carefully managed recirculating raceway systems. Various flow rates, exchange rates, and tank to filter ratios were investigated in eleven recirculating systems employing biological filters, settling chambers and foam strippers. Limestone, shells, styrofoam and teflon rings served as effective filter media, but coal slag restricted water flow and was not satisfactory. An equation was developed to evaluate the effects of system design on water quality. Water quality varies directly with fresh water exchange, flow rate per tank, and the filter size. Production was greater in systems with small tanks and large filters (5 lb/ft3) than in systems with large tanks and small filters (1 lb/ft3). Densities in excess of 7 lb/ft3 per tank have been obtained, indicating recirculating systems may become an increasingly important method of fish culture.
W74-12203

PROCEEDINGS, SYMPOSIUM ON CONTROL OF FINE PARTICULATE EMISSIONS FROM INDUSTRIAL SOURCES.
For primary bibliographic entry see Field 5A.
W74-12208

WORKBOOK OF THERMAL PLUME PREDICTION, VOLUME 2, SURFACE DISCHARGES,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5B.
W74-12212

AN EVALUATION OF TAILINGS PONDS SEALANTS,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
D. A. Clark, and J. E. Moyer.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-065, $0.70, microfiche from NTIS, Springfield, Va 22161 as PB-235 929 $2.25. Environmental Protection Agency, Technology Series, Report EPA-660/2-74-065, June 1974. 29 p, 2 fig, 2 tab, 29 ref. EPA Project 21AGF-16, Program Element 1BB040.

Descriptors: *Linings, *Soil sealants, *Impervious membranes, Waste disposal, Liquid wastes, Solid wastes, Permeability, Seepage, Monitoring, Liquid limits, Plastics, Mine wastes, Costs, Sealants, Seepage control.
Identifiers: Liner costs, Latexes, Fiberglass, Seepage detection, Mill tailings ponds.

A summary is presented of the rather limited information available in the literature pertaining to the use of sealants for mine and mill tailings ponds. Included is a discussion of currently employed seepage detection methods, as well as the various types of sealants currently in use--compacted earth, clays, chemicals, waste tailings solids, asphalt, and synthetic liners will prevent all seepage. Installation costs of the sealants, including labor, are discussed and graphs for estimating costs based on pond size are presented. Regulations governing the amount of seepage allowed are ill-defined or non-existent in the majority of States. (EPA)
W74-12217

DEVELOPMENT OF FIELD-APPLIED DDT,
Envirogenics Systems Co., El Monte, Calif.
K. H. Sweeny, J. R. Fischer, A. F. Graefe, D. H. Liu, and H. J. Marcus.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-036, $1.45; microfiche from NTIS, Springfield, Va 22161 as PB-235 943, $2.25. Environmental Protection Agency, Technology Series Report EPA-660/2-74-036, May 1974. 95 p, 2 fig, 53 tab, 35 ref, append. EPA Contract 14-12-922, Program Element 1BB039.

Descriptors: *Pesticide removal, *DDT, *Reduction(Chemical), *Pesticide toxicity, Chlorinated hydrocarbon pesticides, *DDE, Pesticide kinetics, Water pollution control, Water pollution effects, Rainbow trout, Daphnia, Sun fishes, Reproduction, Minnows.
Identifiers: *Pesticide degradation, TTTB.

Laboratory studies were carried out as a part of initial development of a concept of controlled destruction of field applied DDT pesticide. Copper catalyzed aluminum reductant was shown to degrade DDT in 24 hr at 25C and 4 hr at 40C without forming DDE. Copper catalyzed iron required a week to reduce DDT at 25C and 8 hr at 40C. Acidity for field degradation of DDT can be supplied by solid acids such as sulfamic, oxalic, or citric. An integrated degradable particle was demonstrated by a 5 micrometer reductant particle overlaid with sulfamic acid and coated with DDT. Only moisture is needed to initiate decomposition. In a demonstration 98.4% of the DDT was destroyed in 6 days and 99.8% in 2 weeks at 25C. Product TTTB is 50-fold less fat soluble than DDT and nearly insoluble in water. Product DDEt is 20-fold more soluble than DDT in water. The vapor pressure of DDEt is about 80-fold greater than DDT. Exposure of fathead minnows bluegills and rainbow trout to water saturated with DDEt (.05ppm) or TTTB (.001 ppm) produced no acute toxic effects. The TLm of DDEt to Daphnia is about 35 ppb. Long term chronic exposure of fathead minnows to DDEt saturated waters showed no effect on adult growth and survival, egg production or hatchability. Growth and survival of freshly hatched fry were affected by DDEt above about .006 ppm. No effect on fathead minnow adult or fry growth and survival, egg production or hatchability was shown by TTTB saturated water. Nearly mature fathead minnows consumed 10 mg/kg body weight/day of DDEt to 980 mg/kg body weight/day of TTTB in food without apparent deleterious effect. (EPA)
W74-12218

FEASIBILITY OF EMISSION STANDARDS BASED ON PARTICLE SIZE,
Midwest Research Inst., Kansas City, Mo.
L. J. Shannon, P. G. Forman, and W. Park.
Copy Available from GPO Sup Doc as EP1.23:600/5-74-007, $2.50; microfiche from NTIS, Springfield, Va 22161 as PB-236 160, $2.25. Environmental Protection Agency, Socioeconomic Studies Series, Report EPA-600/5-74-007, March 1974. 221 p, 25 fig, 53 tab, 89 ref, 3 append. EPA Program Element 1HA091, Contract 68-01-0428.

Descriptors: *Standards, *Air pollution, *Feasibility studies, *Particle size, Economic feasibility, *Regulation, Benefits, Pollutants.
Identifiers: Particulates, *Emission standards, Technical feasibility, *Fine particle emissions.

The technical and economic feasibility of particulate emission standards based on particle size was assessed. Attention was focused on standards to regulate the emission of fine particulates--particulates below 2 microns in size. The program was divided into four major areas of effort: (1) Analysis of approaches for regulating fine particle emissions from stationary sources. (2) Definition of technological and economic requirements necessary for implementation of emission standards. (3) Identification of benefits that would accrue if control procedures for fine particulates can be implemented. (4) Assessment overall feasibility of implementation of fine particle emission standards. (EPA)
W74-12219

NITROGEN AND PHOSPHORUS LOSSES FROM AGRONOMY PLOTS IN NORTH ALABAMA,
Alabama A and M Univ., Normal.
For primary bibliographic entry see Field 5B.
W74-12221

ENVIRONMENTAL GUIDELINES FOR DEVELOPMENT ROADS IN THE SUBARCTIC,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
F. B. Lotspeich, and A. E. Helmers.
Copy available from GPO Sup Doc as EP1.23:660/3-74-009, $1.15; microfiche from NTIS as PB-235 932. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-009, June 1974. 63 p, 42 fig, 20 ref. EPA Project 21ARX, Program Element 1BA021.

Descriptors: *Permafrost, *Erosion, Resources, *Access routes, Environmental control, Water quality, *Roads, *Subarctic, Sedimentation, *Standards, Regulation.
Identifiers: Thermal erosion.

This set of guidelines is based on Federal and State regulations that set standards to protect the total environment. Although major highway construction is under stringent regulation, pioneer type access roads such as are needed by loggers, miners, land developers, etc., have been neglected. These smaller roads frequently pose serious erosion hazards because planning, design, and construction of them is not thorough, as it is for major roads; this results in erosion, fire and insect traps, and generally unattractive roadways. Suggestions and recommendations contained in these guidelines are for the use of operators with limited engineering and planning staffs. Although all examples of poor practices are from the vicinity of Fairbanks, all suggested treatments are taken from the literature from the conterminous United States, with some modifications for subarctic conditions. Most of these recommendations are simple in concept, and if properly applied, do prevent erosion and result in superior access roads which are esthetically pleasing. (EPA)
W74-12223

PHYTOPLANKTON NUTRITION AND PHOTOSYNTHESIS IN LAKE MINNETONKA AND LAKES AT FAIRMONT, MINNESOTA,
Minnesota Univ., Minneapolis. Dept. of Ecology and Behavioral Biology.
For primary bibliographic entry see Field 5C.
W74-12227

PHOSPHATE REMOVAL BY SANDS AND SOILS,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 5E.
W74-12235

WEBER RIVER BASIN INCLUDING DAVIS COUNTY AND THE OGDEN S.M.S.A.: WATER QUALITY MANAGEMENT PLANNING, PHASE I--PROGRAM DESIGN.
Stevens, Thompson and Runyan, Inc., Portland, Oreg. and Nielsen, Maxwell and Wangsgard, Inc., Salt Lake City, Utah.
For primary bibliographic entry see Field 6A.
W74-12238

A SHORT TERM TREATMENT OF MALACHITE GREEN AND FORMALIN FOR THE CONTROL OF ICHTHYOPHTHIRIUS MULTIFILIIS ON CHANNEL CATFISH IN HOLDING TANKS,
Alabama Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
J. H. Schachte, Jr.
The Progressive Fish-Culturist, Vol 36, No 2, p 103-104, April 1974. 4 ref.

Descriptors: *Channel catfish, *Fish parasites, *Protozoa, Pesticides, Pest control, Fish farming, Catfishes, Parasitism, Biocontrol, Diseases, Toxicology, Mortality, Fish diseases, Fishkill, Antiprotozoals(Pesticides), Microorganisms.
Identifiers: *Ichthyophthirius multifiliis, Formalin, Malachite green, Trophozoites.

Infection of the ciliated protozoan parasite, Ichthyophthirius multifiliis, in holding tanks was controlled by a combination of malachite green and formalin. A mixture of 0.1 ppm malachite green and 15 ppm formalin brought the infestation under control in four days. (Katz)
W74-12269

PERCEPTION OF WATER QUALITY BY SELECT RESPONDENT GROUPINGS IN INLAND WATER-BASED RECREATIONAL ENVIRONMENTS,
Rensselaer Polytechnic Inst., Troy, N.Y. Freshwater Inst.
K. J. Kooyoomjian, and N. L. Clesceri.
Water Resources Bulletin, American Water Resources Association, Vol 10, No 4, p 728-744, August 1974. 6 fig, 5 tab, 13 ref.

Descriptors: *Trophic level, *Recreation, *Lakes, *Water quality, *Water users, *Data processing, Fishing, Eutrophication, Oligotrophy, Statistics, Water sports, Attitudes, Ecology, Sampling, Data collection, *New York.
Identifiers: Lake George(NY), Oneida Lake(NY), Saratoga Lake(NY), Schroon Lake(NY), Cluster level analysis.

Data on perceptions of water quality in oligotrophic and eutrophic lakes were obtained from a questionnaire survey of several user groups in New York state. The responses of recreationists, cottage and homeowners, and fishermen were compared utilizing percentage response profiles and cluster level groupings. The survey examined four lake environments which were paired by size and each pair contained both trophic states. The large-size pair were Lake George (oligotrophic) and Oneida Lake (eutrophic). The intermediate-size pair were Schroon Lake (oligotrophic) and Saratoga Lake (eutrophic). Partial analysis of the data indicated that the selected lakes are reasonable trophic state and points for polarizing user group attitudes toward water quality. Each user group surveyed appeared sensitive to select water quality parameters; where shifts in sensitivity appear within the between user groups with changes in ecological settings, as well as with factors independent of ecological settings. (Harmeson-ISWS)
W74-12287

THE ELECTRICAL PROCESS IN THE BREAKING OF DILUTE OIL-IN-WATER EMULSIONS,
Georgia Inst. of Tech., Atlanta. High Temperature Materials Div.
For primary bibliographic entry see Field 5D.
W74-12343

FEASIBILITY STUDY TO DEVELOP GUIDELINES FOR LAKE AND RELATED LAND RESOURCE USE DEVELOPMENT RESEARCH, OR ECONOMIC AND ECOLOGICAL IMPACT OF VARIOUS FORMS OF LAKE RESOURCE DEVELOPMENT,
New Hampshire Univ., Durham. Water Resource Research Center.
For primary bibliographic entry see Field 2H.
W74-12350

WATER RESOURCES PROTECTION MEASURES IN LAND DEVELOPMENT - A HANDBOOK,
Delaware Univ., Newark. Water Resources Center.
J. Tourbier, and R. Westmacott.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 049, $6.50 in paper copy, $2.25 in microfiche. Completion Report, April 1974. 237 p, 36 fig. OWRT C-4247(No. 9036)(1).

Descriptors: *Design criteria, *Measurement, *Protection, *Environmental control, Urban runoff, Infiltration, Erosion, Sediment yield, Flooding, Sewage disposal, Legal aspects, *Comprehensive planning, Land development, *Delaware, *Integrated control measures, Water pollution control.
Identifiers: *Christina River Basin(Del), New Castle County(Del), Urban development.

A description is presented of measures that can become in integrated part of urban development to lessen problems that would otherwise adversely affect water resources. These problems consist of runoff increases and decreases in infiltration and a greater degree of erosion and sedimentation, flooding, runoff pollution and discharge of sewage effluent. Issues have been analyzed individually in the Christina River Basin and, where possible, quantified. Measures are presented in groups and related directly to the problems listed above. Each group is preceded by a flow chart that relates individual measures to each other, and can aid in the selection of alternative techniques that follow a logical sequence. Each measure has been described, and site characteristics to which it is applicable, identified. The application, advantages and disadvantages, design criteria and outline specifications, cost guidelines and maintenance, and legal implementation of each measure are individually covered. Illustrated case studies give examples of measures which have been constructed in the field. Legal implications of implementation on the county, State and regional level are described. The State of Delaware is used as an example.
W74-12352

FIELD TEST OF AN ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY,
Georgia Inst. of Tech., Atlanta.
For primary bibliographic entry see Field 6G.
W74-12357

WATER QUALITY IMPROVEMENT OF STRATIFIED IMPOUNDMENTS BY SELECTIVE WITHDRAWAL OF BOTTOM WATERS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
P. L. Monkmeyer, J. A. Hoopes, K. V. R. Henkel, J. C. Ho, and G. R. Clark.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 043, $3.75 in paper copy, $2.25 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report 74-05. Partial Completion Report, July, 1974. 67 p, 16 fig, 43 ref. OWRT B-080-WIS(3). 14-31-0001-3948.

Descriptors: Model studies, Hydraulics, *Impoundments, *Stratified flow, *Withdrawal, *Destratification, *Water quality, Lakes, Reservoirs, Water pollution control, Forecasting.
Identifiers: *Selective withdrawal, Bottom withdrawal.

A variety of methods have been proposed to improve the water quality of lakes and reservoirs. The work described is directed toward the overall improvement of water quality in a reservoir through the removal of the poor quality, hypolimnetic water. In particular, theoretical and experimental investigations on selective withdrawal of a viscous, non-diffusive, linearly-stratified fluid from the bottom of a reservoir have been carried out. The governing differential equations which describe planner and axisymmetric withdrawal are derived. In each case, an assumed horizonatal velocity profile is substituted into the integral form of the momentum equation; the resulting ordinary differential equation is solved numerically to give the variation with distance from the outlet of the thickness of the layer of hypolimnetic water withdrawn. Using the assumed velocity profile and the principle of mass conservation, expressions are derived in each case to predict the quality of the water withdrawn. Laboratory experiments are conducted; the results obtained verify the theoretical predictions. Procedures for predicting the withdrawal layer thickness and discharged water quality in an actual reservoir are discussed.
W74-12370

PROCEEDINGS OF THE XV EUCEPA CONFERENCE ON HARMONIZING PULP AND PAPER INDUSTRY WITH ENVIRONMENT,
Held in Rome, Italy, May 7-11, 1973, by ATICELCA (Associazione Tecnica Italiana per la Cellulosa e la Carta), Rome, Italy, in cooperation with FAO, 1973, 806 p.

Descriptors: *Pulp and paper industry, *Pulp wastes, *Conferences, *Water pollution control, Legal aspects, Economics, Water management(Applied), Waste water(Pollution), Pollution abatement, Europe, Water supply, Industrial wastes, Treatment facilities, Water conservation, Industrial water, Air pollution, Waste water treatment, Water conservation, Water reuse, Water quality control, *Environment.

Cosponsored by FAO (Food and Agriculture Organization of the United Nations) and ATICELCA (Italian Technical Association of the Pulp and Paper Industry), this 15th annual EUCEPA (Comite Europeen de Liaison pour la Cellulose et le Papier) Conference was dedicated to environmental problems of the paper and allied industries. Numerous technical presentations dealt with technological, economic, and legislative aspects of water and air pollution control in the paper industries of various countries, not only in Europe, but also in the USSR and North America. Most of the printed contributions and their subsequent discussions from the floor are reproduced in English, a few being given in French or German. (See W74-12401 thru W74-12431) (Brown-IPC)
W74-12400

TECHNICAL REPORT FROM THE STOCKHOLM UN CONFERENCE,
Swedish Water and Air Pollution Research Lab., Stockholm.
For primary bibliographic entry see Field 6G.
W74-12401

SURVEY OF ENVIRONMENTAL LEGISLATION IN THE GERMAN FEDERAL REPUBLIC (UEBERSICHT UEBER DIE UMWELTGESETZGEBUNG IN DER BUNDESREPUBLIK DEUTSCHLAND),
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
For primary bibliographic entry see Field 6E.
W74-12402

FRENCH LEGISLATION AND POLICIES REGARDING ENVIRONMENTAL PROTECTION (LEGISLATION ET POLITIQUE FRANCAISES EN MATIERE DE PROTECTION DE L'ENVIRONNEMENT),
Societe Aussedat-Rey, Saillat (France).
For primary bibliographic entry see Field 6E.
W74-12403

LEGISLATION ON ENVIRONMENTAL PROTECTION IN SCANDINAVIA,
National Water Board of Finland, Helsinki.
For primary bibliographic entry see Field 6E.
W74-12404

CANADA'S APPROACH TO ENVIRONMENTAL POLLUTION CONTROL FOR THE PULP AND PAPER INDUSTRY,
Environmental Protection Service, Ottawa (Ontario).
L. Edgeworth.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 103-109, 1973.

Descriptors: *Legislation, *Pulp wastes, *Pollution abatement, *Environmental control, *Canada, Governments, Regulation, Pulp and paper industry, Waste water treatment, Water pollution control, Water quality standards, Standards, Industrial wastes, Water quality control.

Key characteristics of Canada's federal and provincial antipollution regulations include: (1) a program of point source control, (2) bases founded on best practicable technology, (3) distinctions between older and newly constructed pulp and paper mills, (4) uniform standards for minimum wastewater quality across all of Canada, and (5) decisions based on input from both government and industry. (See also W74-12400) (Brown-IPC)
W74-12405

INFLUENCE OF THE WATER POLLUTION,
World Health Organization, (Denmark). Regional Office for Europe.
For primary bibliographic entry see Field 5C.
W74-12406

A TOTAL PROCESS APPROACH TO WATER AND WASTE MANAGEMENT IN AN EXPANDING FINE PAPER MILL,
Papeteries de Virginal (Belgium).
For primary bibliographic entry see Field 5D.
W74-12407

THE POLLUTION-FREE MILL: FACTS AND VISIONS,
Lekanders Ingenjorsbyra A.B., Alingas (Sweden).
For primary bibliographic entry see Field 5D.
W74-12408

TREATMENT OF CONDENSATE,
Angpanneforeningen, Stockholm (Sweden).
For primary bibliographic entry see Field 5D.
W74-12409

SOME SYSTEMS DEVELOPED FOR POLLUTION ABATEMENT IN THE PULP INDUSTRY, PARTICULARLY OXYGEN BLEACHING,
Mo Och Domsjo A.B., Ornskoldsvik (Sweden).
For primary bibliographic entry see Field 5D.
W74-12410

PULP MILL WATER SYSTEM CLOSURE,
Swedish Forest Products Research Lab., Stockholm.
For primary bibliographic entry see Field 5D.
W74-12411

ESTABLISHMENT OF A CLOSED SYSTEM FOR THE PAPER MAKING PROCESS,
For primary bibliographic entry see Field 5D.
W74-12412

DESIGN PRINCIPLES OF WHITE WATER SYSTEMS WITH SPECIAL REFERENCE TO EFFLUENT CONTROL,
Jaakko Poyry and Co., Helsinki (Finland).
For primary bibliographic entry see Field 5D.
W74-12413

FRACTIONAL INPLANT TREATMENT OF RECYCLE FLOWS BY ADVANCED TECHNIQUES,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 5D.
W74-12414

CLARIFICATION OF WHITE WATER BY VACUUM FILTRATION (KLAERUNG VON WEISSWASSER DURCH VAKUUM-FILTRATION),
For primary bibliographic entry see Field 5D.
W74-12415

EFFECTS OF RAW MATERIALS AND CHEMICAL ADDITIVES ON MILL EFFLUENT LOSSES,
Research Association for the Paper and Board, Printing and Packaging Industries, Leatherhead (England).
For primary bibliographic entry see Field 5D.
W74-12416

THE TREATMENT AND REMOVAL OF WASTE WATER RESIDUAL SLUDGES IN THE PAPER INDUSTRY (DIE BEHANDLUNG UND BESEITIGUNG VON RESTABWASSERSCHLAEMMEN DER PAPIERINDUSTRIE),
Muenchen-Dachauer Papierfabriken Heinrich Nicolaus G.m.b.H. (West Germany).
For primary bibliographic entry see Field 5E.
W74-12417

MECHANICAL TREATMENT OF PULP AND PAPER MILL EFFLUENT,
Nevalainen and Orivuori, Helsinki (Finland).
For primary bibliographic entry see Field 5D.
W74-12418

STUDY ON THE TOXICITY ON FISHES AND THE BIODEGRADABILITY OF THE PAPERMILL WASTES, IN RELATION TO THE BIOCIDES USED,
Ente Nazionale per la Cellulosa e per la Carta, Rome (Italy).
For primary bibliographic entry see Field 5C.
W74-12419

THE USE OF SILICATES AND POLYELECTROLYTES FOR FLOCCULATION,
Papiripari Vallalat Kutato- es Fejlesztointezete, Budapest (Hungary).
For primary bibliographic entry see Field 5D.
W74-12420

THE BIOLOGICAL PURIFICATION OF PAPER INDUSTRY WASTE WATERS (DIE BIOLOGISCHE REINIGUNG VON RESTABWAESSERN DER PAPIERINDUSTRIE),
Cellulose Attisholz A.G., Luterbach (Switzerland).
For primary bibliographic entry see Field 5D.
W74-12421

TERTIARY METHODS OF WASTE TREATMENT,
Balfour-Italia, Rome (Italy).
For primary bibliographic entry see Field 5D.
W74-12422

ACTIVATED CARBON AND OTHER TECHNIQUES FOR COLOR REMOVAL FROM KRAFT MILL EFFLUENTS,
Saint Regis Paper Co., Pensacola, Fla.
For primary bibliographic entry see Field 5D.
W74-12423

NEW FINE PARTICLE TECHNOLOGIES APPLIED TO THE ENVIRONMENTAL PROBLEMS OF THE PAPER INDUSTRY,
English China Clays Ltd., Saint Austell (England).
For primary bibliographic entry see Field 5D.
W74-12424

A STUDY OF THE EFFLUENT TREATMENT FROM AN ITALIAN PAPER MILL,
Cartiera del Timavo, Trieste (Italy).
For primary bibliographic entry see Field 5D.
W74-12425

IMPACT OF POLLUTION ABATEMENT ON CAPITAL ALLOCATION AND PROFITABILITY,
Canadian Pulp and Paper Association, Montreal (Quebec).
D. Jones, H. D. Paavila, and F. G. Hurtubise.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 739-746, 1973.

Descriptors: *Pulp wastes, *Bleaching wastes, *Pollution abatement, *Water pollution control, Costs, *Capital costs, Economics, Treatment facilities, *Canada, Pulp and paper industry.
Identifiers: Profits.

Comments from officials of seven Canadian paper companies regarding the capital and operating costs of antipollution installations are cited to document the considerable impact of such expenditures on company profits and competitive ability. (See also W74-12400) (Brown-IPC)
W74-12426

THE ROLE OF THE CHEMICALS USED IN PAPER AND PAPER BOARD MAKING IN MINIMISING EFFLUENT PROBLEMS,
Imperial Chemical Industries Ltd., London (England).
J. P. Gill.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 753-762, 1973.

Descriptors: *Biodegradation, *Pulp wastes, *Pollution abatement, *Pulp and paper industry, *Additives, *Chemicals, *Pesticides, Water pollution control, Industrial wastes.
Identifiers: Size-press(Paper machine), Wet-end(Paper machine), Slimicides, Retention aids, White water(Paper machine effluent), Closed systems.

Papermaking chemicals can be classified into processing aids and functional or special-purpose additives. Correct selection and controlled dosage of such compounds will achieve optimum retention or solids in the paper sheet, especially in conjunction with retention aids. Closure of the white water system of paper machines is possible by use of slimicides for control of undesirable deposits. Effluent volumes can be reduced also by applying functional additives on the size-press (that is, after the fiber web has been formed), rather than on the wet-end (that is, to the aqueous fiber suspension). Pollution problems can be minimized by development of special biocides and other compounds that are readily biodegradable. Contributions of a British chemical supplier in these areas are indicated. (See also W74-12400) (Brown-IPC)
W74-12427

SYSTEM OF COMBINED AND PROFOUND TREATMENT OF PULP AND PAPER INDUSTRY WASTE WATERS WITH ACTIVATED SLUDGE,
Vsesoyuznyi-Nauchnyi Planovii Otdel Bumazhnoi Promyshlennost, Moscow (USSR).
For primary bibliographic entry see Field 5D.
W74-12428

A PILOT PLANT STUDY FOR THE TREATMENT OF PAPERMILL AND DEINKING EFFLUENTS,
American-Israeli Paper Mills Ltd., Hadera (Israel).
For primary bibliographic entry see Field 5D.
W74-12429

RECENT DEVELOPMENTS IN PAPER MILL EFFLUENT TREATMENT IN FRANCE (DEVELOPPEMENTS RECENTS DU TRAITE-

MENT DES EFFLUENTS DE PAPETERIE EN FRANCE),
Societe Degremont, Paris (France).
For primary bibliographic entry see Field 5D.
W74-12430

AN INTERESTING METHOD OF ABATING POLLUTION IN THE PULP AND PAPER INDUSTRY,
Ecolgenova, S.p.A., Genoa (Italy).
For primary bibliographic entry see Field 5D.
W74-12431

DEVICE FOR RECOVERING FLOATING MATTER FROM WATER SURFACE,
Bridgestone Tire Co. Ltd., Tokyo (Japan). (assignee).
K. Aramaki, H. Kawakami, and Y. Kawaguchi.
U.S. Patent No 3,812,968, 6 p, 15 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 922, No 4, p 1137, May 28, 1974.

Descriptors: *Patents, *Flotsam, *Pollution abatement, *Oil pollution, Water quality control, Water pollution control, Equipment.

The device for recovering floating matter from a water surface comprises a floating frame body, a bucket directed downward. A feeder secured to the frame body in the proximity of the bucket feeds the floating matter to an inlet opening in the bucket. The feeder consists of an endless belt which has an absorptive member secured to the outer surface. There is at least one squeezing roller engaging the endless belt. The belt moves along a closed loop extending from a point above water level to the proximity of the inlet in the bucket. A whirl-generator may be placed within the bucket. (Sinha-OEIS)
W74-12432

APPARATUS FOR CONTROLLING A POLLUTING LIQUID,
Shell Oil Co., New York.
J. P. Oxenham.
U.S. Patent No 3,810,546, 3 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 922, No 2, p 523, May 14, 1974.

Descriptors: *Patents, *Skimming, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Flotsam, Equipment, Separation techniques.

The skimmer comprises a platform having floats and rotatable drums spaced about the periphery of the platform. The drums face in mutually perpendicular directions. Each drum has a weir positioned adjacent to the interface of the liquids to allow a substantial amount of the polluting liquid to pass into the drums. Each of the drums is mounted for rotation about the axis by a suitable shaft and supports on the platform. The skimmer is arranged to remove the polluting liquid from all directions. (Sinha-OEIS)
W74-12436

OIL/WATER SEPARATION ACCELERATION MEDIA,
Oil Mop, Inc., New Orleans, La.
H. M. Rhodes.
U.S. Patent No 3,810,832, 2 p, 9 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 922, No 2, p 593, May 14, 1974.

Descriptors: *Patents, *Oily water, Water quality control, Waste water treatment, *Pollution abatement, Water pollution control, *Separation techniques.

The oil and water mixture is directed through a barrier of filaments of polypropylene arranged across the path of mixture. The barrier is anchored at its base at the bottom of the fluid holding pond. The free ends of the strips of polypropylene are directed upward forming an inclined plane up which the oil droplets amalgamate assisted by the buoyancy of the oil and the force flow vector of the mixture passing through the fluid holding pond. (Sinha-OEIS)
W74-12437

METHOD AND A DEVICE FOR COLLECTING SUBSTANCES FLOATING IN A LIQUID SURFACE,
H. L. Bergman.
U.S. Patent No, 3,817,385, 4 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 923, No 3, p 950, June 18, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Flotsam, *Pollution abatement, Water quality control, Water pollution control, Equipment, Separation techniques.

The collecting device is carried on a ship and is provided with a supply of paper rolls. The collecting device comprises a conveyor in the form of an endless band of a suitable material which is adapted to run around two spaced rollers. The conveyor band may be driven conveniently by causing one of the rollers to rotate by means of a motor. The two rollers are mutually connected to a rigid assembly by means of a frame so that one end of the conveyor can be placed in the water while the other end of the conveyer is located adjacent to a collecting table, which makes it possible to transfer the material transported by the conveyor to a collecting receptacle. At its end immersed in the water, the conveyor frame is provided with two guide plates arranged in V-form to guide floating substances on the water surface in the direction of the conveyor. (Sinha-OEIS)
W74-12446

OIL/WATER SEPARATION AND RECOVERY SYSTEM,
Pollution Recovery Systems, Okland, Calif.
J. D. Pavolvic.
U.S. Patent No. 3,815,751, 9 p, 14 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 923, No 2, p 550, June 11, 1974.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Pollution abatement, Water quality control, Water pollution control, Equipment, *Separation techniques.
Identifiers: *Oil waste recovery.

A separating tank is provided having first and second sections partially separated by a wall extending across the tank. An intake channel directs the flow of fluids downward, permitting contact between the lower density fluid flowing in the channel and a layer of the lower density fluid maintained in the tank, so as to capture the major portion of the entering lower density fluid. The higher density fluid plus entrained lower density fluid is directed downward into the second section and assumes a tortuous path over the wall into the first section, while the lower density fluid escapes upwards into the layer of the lower density fluid. The separating tank is mounted in a vessel below fluid level and the intake channel connected to a flexible articulated trough which is controlled to maintain a relatively constant level of fluid, until the fluid reaches the downward curing portion of the channel. A flexible boom is provided for containing the oil or other fluid in anticipation of or during the removal and separation operation. (Sinha-OEIS)
W74-12451

APPARATUS FOR AND METHOD OF AUTOMATICALLY REMOVING POLLUTANTS FROM A FLOWING STREAM,
Societe Alsthom, Grenoble (France).
J. L. Dubouchet.
U.S. Patent No 3,815,742, 4 p, 6 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 923, No 2, p 547, June 11, 1974.

Descriptors: *Patents, *Flotsam, *Oily wastes, Waste water treatment, Liquid wastes, *Pollution abatement, Water pollution control, Water quality control, *Separation techniques.

A separator is used so that there may be by-passed or diverted thereinto a portion of the tap of a stream on which flotsam has collected. At the downstream end of the separator, is a vertical liquid chamber. Associated with this chamber are means for permitting the discharge of separated liquid from it supper portion while maintaining the level of the liquid at a given constant above the maximum height of any interface that may exist between the liquid and pollutant material. (Sinha-OEIS)
W74-12453

FINAL CONFERENCE REPORT FOR THE NATIONAL CONFERENCE ON MANAGING THE ENVIRONMENT.
For primary bibliographic entry see Field 6G.
W74-12457

BEYOND THE BRUSHFIRES,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-12458

MANAGEMENT FOR THE FUTURE,
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-12459

THE ECONOMICS OF ECOLOGY,
Colorado Univ., Boulder.
For primary bibliographic entry see Field 6G.
W74-12460

PLANNING FOR QUALITY GROWTH,
Hawaii State Dept. of Planning and Economic Development, Honolulu.
For primary bibliographic entry see Field 6G.
W74-12461

STATE GOVERNMENTS TACKLE POLLUTION,
Woodrow Wilson International Center for Scholars, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-12465

IMPLEMENTATION OF CITIZEN PARTICIPATION IN THE MUNICIPAL PROCESS,
Environmental Protection Agency, Washington, D.C. Technical Assistance Research Programs.
For primary bibliographic entry see Field 6G.
W74-12468

FIXED VERSUS VARIABLE ENVIRONMENTAL STANDARDS,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 6G.
W74-12470

THE STRATEGIC ENVIRONMENTAL ASSESSMENT SYSTEM (SEAS): A RESEARCH PROJECT,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-12472

UNRECORDED POLLUTION FROM URBAN RUNOFF,
Rutgers-The State Univ., New Brunswick, N. J., Water Resources Research Inst.
W. Whipple, J. V. Hunter, and S. L. Yu.
Journal of the Water Pollution Control Federation, Vol 46, No 5, p 873-885, May, 1974. 6 fig, 2 tab, 22 ref. OWRR A-025-NJ(5).

Descriptors: *Urban runoff, *Urban planning, *Waste disposal, *Water pollution sources, Pollution, Wastes, Streams, Biochemical oxygen demand, Planning.
Identifiers: Waste recording.

A study has been done on unrecorded pollution caused by concentrations of urban populations. It was concluded that in the case of developing urban areas when the stage of secondary treatment of recorded wastes is arrived at, the unrecorded pollution sources will account for more than half of the pollution in streams. These unrecorded wastes will be found too large to be ignored in planning. An approximation of unrecorded BOD loading of 0.02 to 0.03 lb/day/person may be used for clean residential urban development. (Murphy-FIRL)
W74-12523

OIL, GAS, AND WATER LAW--TODAY AND TOMORROW,
Gee and Hearon, Austin, Tex.
For primary bibliographic entry see Field 6E.
W74-12547

WHAT EXPLORATION GEOLOGISTS SHOULD KNOW ABOUT POLLUTION,
Texas Univ., Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 5B.
W74-12548

OIL AND GAS VERSUS WATER IN THE SOUTHWEST: CONFLICT OR COMPROMISE,
Humble Oil and Refining Co., Corpus Christi, Tex.
For primary bibliographic entry see Field 6E.
W74-12549

WATER POLLUTION POLICY.
For primary bibliographic entry see Field 6E.
W74-12604

DEPOSITING TRASH, GARBAGE, ETC., ON LANDS OF ANOTHER OR IN WATERS OF THE STATE.
For primary bibliographic entry see Field 6E.
W74-12605

WATER AND WATER SUPPLY POLLUTION.
For primary bibliographic entry see Field 6E.
W74-12606

POTOMAC VALLEY CONSERVANCY DISTRICT.
Committee on Public Works, (U.S. House).
For primary bibliographic entry see Field 6E.
W74-12608

WATER BANK ACT--REPORT.
Committee on Agriculture and Forestry (U.S. Senate).
For primary bibliographic entry see Field 6E.
W74-12610

OCEAN DUMPING CONVENTION IMPLEMENTATION.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W74-12611

HIGH SEAS OIL PORT ACT.
For primary bibliographic entry see Field 6E.
W74-12615

A PLAN FOR MICHIGAN'S SHORELANDS.
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 6E.
W74-12616

SURVEY OF ENVIRONMENTAL LEGISLATION,
For primary bibliographic entry see Field 6G.
W74-12618

DEEPWATER PORTS.
For primary bibliographic entry see Field 6E.
W74-12619

CORPS OF ENGINEERS DREDGE AND FILL JURISDICTION: BUTTRESSING A CITADEL UNDER SIEGE,
W. C. Hoyer.
University of Florida Law Review, Vol 26, No 1, p 19-40, Fall 1973. 125 ref.

Descriptors: *Wildlife conservation, *Shorelines, *Construction, *Administration, *Regulation, Federal government, Legislation, Tidal wetlands, Aquatic habitats, Water resources development, Recreation, Institutional constraints, Administrative agencies, Political aspects, Adoption of practices, Aesthetics, Ecology, Coastlines, Legal aspects, Planning, Waste water pollution, Water law.
Identifiers: *Coastal waters, *Fill permits, *Administrative regulations.

Coastal and estuarine wetlands are vital to the survival of fish and wildlife. They also have a function in controlling floods and tidal forces. All of the nation's shorelines are facing pollution or development. Uncontrolled and unplanned dredging and filling of these areas have resulted in a depletion of aquatic resources. Unspoiled beach and shore areas available for public use are becoming scarce. The United States Army Corps of Engineers has major statutory responsibility for most of these shorelands. Work in waterways where the Corps has jurisdiction is subject to Corps approval. The Corps thus plays a role requiring significant environmental responsibility. Being a developer, itself, the Corps has not traditionally been oriented toward resource conservation. The Corps is not presently administratively organized to evaluate ecological factors fairly. The Corps is being impaled by environmentalists for its lack of aggressiveness, at the same time being criticised by developers for lack of clarity and consistency. The basis for Corps of Engineers jurisdiction over dredge and fill projects is examined, and the expansion of that jurisdiction into the environmental arena is traced. (Sperling-Florida)
W74-12620

OIL SPILLS: HOW SERIOUS A PROBLEM.
For primary bibliographic entry see Field 5B.
W74-12621

ENVIRONMENTAL DEFENSE FUND V. FROEHLKE (REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENTS).
For primary bibliographic entry see Field 6E.
W74-12623

REPORT OF THE RIVER MASTER OF THE DELAWARE RIVER FOR THE PERIOD DECEMBER 1, 1972 - NOVEMBER 30, 1973.
Office of Delaware River Master, Milford, Pa.
For primary bibliographic entry see Field 4A.
W74-12634

OIL/WATER INTERFACE DETECTOR LABORATORY EVALUATION,
Esso Research and Engineering Co., Florham, N.J.
For primary bibliographic entry see Field 5A.
W74-12637

AIR POLLUTION FROM FUEL COMBUSTION IN STATIONARY SOURCES.
Processes Research, Inc., Research Triangle Park, N.C. Industrial Planning and Research.
Available from NTIS, Springfield, Va 22161 as PB-222 341, Price $4.25 printed copy; $2.25 microfiche. Final Report EPA R2-73-241, on U S National Report to OECD Joint Group on Air Pollution from Fuel Combustion in Stationary Sources, October 1972. 109 p.

Descriptors: *Air pollution, *Sulfur, *Nitrogen, Dusts, *Pollution abatement, Sampling, Planning, *Oxides.
Identifiers: Air pollution control, Combustion.

Estimates are given of past and future fuel consumption in stationary combustion sources and of the associated quantities of the air pollutants-sulfur oxides, nitrogen oxides, and particulate-emitted to the atmosphere from the combustion of these fuels. Abatement strategies to control the 1980 level of pollutant emissions are proposed. The projected emissions of sulfur and nitrogen oxides could be expected to approximately double the 1968 levels of pollution without implementation of new controls. Those of particulate emissions are expected to increase some tenfold without the best control practices. The 1980 emissions can be controlled to the targeted levels through implementation of control and fuels management practices. The estimated costs for achieving control approach a total estimated capital expenditure of about $13 billion (cumulative through 1980) and an annual operating cost climbing to $2.8 billion in 1980 (1970 dollar estimates). (Knapp-USGS)
W74-12640

EVALUATION OF CONCEPTS FOR SEPARATING OIL FROM WATER DISCHARGED FROM SHIPS,
Coast Guard, Washington, D.C. Office of Research and Development.
W. C. McKay.
Available from NTIS, Springfield, Va. 22161 as AD-770 346, Price $4.25 printed copy, $2.25 microfiche. Technical Report, August 1973. 117 p, 9 ref.

Descriptors: *Oily water, *Ships, *Water pollution control, *Separation techniques, Waste water treatment, Pollution abatement.

Methods for separating oil from water discharged from ships were tested. The eight systems evaluated are: tubular membrane separator, centrifugal coalescer separator, laminar flow coalescing plate separator, ultrafiltration separator, electrochemical flotation separator, vacuum desorption air flotation separation, viscosity separation, and vortex separation. It is essential that oil-water mixtures be emulsified as little as possible prior to separation. Emulsification of the mixture can be reduced by the elimination of detergent cleaning agents, by the de-rating of centrifugal pumps to 50% of the designed rpm, and when practical, locating the pump after the separator. Ultrafiltration systems and the electroflotation systems consistently produced high quality effluent discharges with less than 10 parts per million of oil. Centrifugal systems are most suited for high volume ballast water cleaning systems because of their small size and high flow capability. Laminar-flow, parallel-plate separators offer possibilities for separating oil from ballast water when the oil-water mixture is not emulsified. Cartridge coalescers can meet effluent discharge standards, when operated to prevent ingestion of detergents and to reduce mechanical mixing of the influent. (Knapp-USGS)

W74-12642

ASSESSMENT OF BIODEGRADATION POTENTIAL FOR CONTROLLING OIL SPILLS ON THE HIGH SEAS,
Oklahoma State Univ., Stillwater. Dept. of Biochemistry.
R. K. Gholson, P. Guire, and J. Friede.
Available from NTIS, Springfield, Va. 22161 as AD-759 848, Price $5.45 printed copy, $2.25 microfiche. Contract Report for US Coast Guard, September 1972. 130 p, 19 fig, 4 tab, 203 ref. DOT-CG Contract 20, 260-A.

Descriptors: *Oil spills, *Oily water, *Biodegradation, *Water pollution control, Water pollution treatment, Aquatic microorganisms, Reviews, Research and development.

Research work related to the problem of the biodegradation of marine oil spills was reviewed to determine the practical feasibility of controlling oil spills and residues by biodegradation and to define those areas requiring additional research and development. There are several means by which crude oil and refined petroleum products may be introduced into the marine environment. First, there are shipping disasters, of which the Torrey Canyon and the Tampico Maru are recent notable examples. A second kind of accident which can result in large quantities of crude oil being released into the sea is an uncontrolled seep occurring when a new oil well is being sunk on the Continental Shelf. However, a greater total amount of oil pollution may result from deliberate release of many small quantities of oil onto the sea by tankers and other cargo vessels. Also, the loading and unloading of oil cargo constitutes a hazard in harbors and ports. Oil pollution of the ocean also occurs from runoff by way of rivers and sewage systems. Many natural oil seeps on the ocean floor constitute another continuous source of petroleum entering the marine environment. Natural processes cause the oil to disappear. These processes include disposal by evaporation, emulsification, sinking and beaching of the oil components and destruction by oxidation and by microbial degradation. Microbial oxidation of the oil is the main reason that the oceans and beaches of the world are not completely covered with petroleum hydrocarbons. Hydrocarbon oxidation has been observed in a wide variety of both terrestrial and marine microorganisms including many species of bacteria and several species of yeast and fungi. (Knapp-USGS)
W74-12649

HYDROLOGIC DATA FOR URBAN STUDIES IN THE AUSTIN, TEXAS METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-12653

APPRAISAL OF OPERATING EFFICIENCY OF RECHARGE BASINS ON LONG ISLAND, NEW YORK, IN 1969,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-12655

WATER QUALITY CRITERIA 1972, A REPORT OF THE COMMITTEE ON WATER QUALITY CRITERIA.
National Academy of Sciences-National Academy of Engineering, Washington, D.C. Environmental Studies Board.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 199, $2.25 in microfiche. Environmental Protection Agency, Ecological Research Series, March 1972. 594 p, 3 append. EPA-R3-73.033.

Descriptors: *Water quality standards, *Reviews, *Regulation, *Baseline studies, Basic data collections, Recreation, Aesthetics, Water supply, Aquatic life, Wildlife, Irrigation water, Industrial water, Freshwater fish, Marine animals, Marine fish, *Toxicity, *Lethal limit, *Toxins, Bibliographies.

In 1971, at the request of the Environmental Protection Agency, the National Academy of Sciences-National Academy of Engineering undertook the revision of WATER QUALITY CRITERIA, the 1968 Report of the National Technical Advisory Committee (NTAC) to the Secretary of the Interior. The Academies appointed a Committee on Water Quality Criteria and six Panels, and the responsibility for overseeing their activities was assigned to the Environmental Studies Board, a joint body of the Academies. The guidelines for the Academies' Committee were-similar to those followed by the NTAC. The Committee's six Panels were: (1) Recreation and Aesthetics, (2) Public Water Supplies, (3) Freshwater Aquatic Life and Wildlife, (4) Marine Aquatic Life and Wildlife, (5) Agricultural Uses of Water, and (6) Industrial Water Supplies. In the 1972 Report many new subjects are discussed in detail, among them: the recreational impact of boating, levels of use, disease vectors, nuisance organisms, and aquatic vascular plants; viruses in relation to public water supplies; effects of total dissolved gases on aquatic life; guidelines for toxicological research on pesticides and uses of toxicants in fisheries management; disposal of solid wastes in the ocean; use of waste water for irrigation; and industrial water treatment processes and resultant wastes. Many toxic or potentially toxic substances not considered by the NTAC are discussed including polychlorinated biphenyls, phthalate esters, nitrilotriacetate (NTA), numerous metals, and chlorine. The six Sections do not provide summaries; an understanding of how the recommendations should be interpreted and used can be gained only by a thorough reading of the rationale and the evaluation of criteria preceding the recommendations. (See also W74-12675)
W74-12674

RESEARCH NEEDS IN WATER QUALITY CRITERIA, 1972.
National Academy of Sciences-National Academy of Engineering, Washington, D.C. Environmental Studies Board.
Available from Environmental Studies Board, National Academy of Sciences, 2101 Constitution AV, NW, Washington, DC 20418. NAS-NAE Report, Washington, DC, 1973. 64 p, 1 fig, 3 tab, 79 ref.

Descriptors: *Research priorities, *Water quality standards, *Reviews, *Regulation, *Baseline studies, Basic data collections, Recreation, Aesthetics, Water supply, Aquatic life, Wildlife, Irrigation water, Industrial water, Freshwater fish, Marine animals, Marine fish, *Toxicity, *Lethal limit, *Toxins, Bibliographies.

In conjunction with the primary task of revising and updating Water Quality Criteria, the NAS-NAE Committee on Water Quality Criteria compiled research needs as limitations to establishing criteria were encountered because of a lack of scientific information. The present document reports on those needs and is intended to serve as a guide to scientists, research program managers, and institutions involved in fostering scientific information relating to water quality requirements for the various uses made of the nation's waters. Because the report is based largely on the Committee's initial report, Water Quality Criteria, 1972, it should be used in conjunction with it, as the rationale for most of the research needs reported here is found there. This report is crossreferenced by page numbers to appropriate sections of Water Quality Criteria, 1972. (See also W74-12674)
W74-12675

HEALTH HAZARDS OF THE HUMAN ENVIRONMENT.
For primary bibliographic entry see Field 5B.
W74-12679

CONTROL OF CATCH-BASIN MOSQUITOES USING ZOECON ZR515 FORMULATED IN A SLOW RELEASE POLYMER: A PRELIMINARY REPORT,
California Univ., Davis. Dept. of Entomology.
R. L. Dunn, and F. E. Strong.
Mosq News. Vol 33, No 1, p 110-111. 1973.

Descriptors: *Mosquitoes, Polymers, Toxicity, *Pesticide toxicity.
Identifiers: Hormones, *Zoecon(ZR-515), Juvenile hormones, Catch-basin mosquitoes, Slow-release polymers.

The potential effectiveness of a slow-release polymer-juvenile hormone (JH) system was demonstrated on a catch-basin study. The slow-release polymers overcame a previously described problem a short residual toxicity. Now, catch basins treated early in the breeding season may result in effective control for the entire season with a single application of a JH-slow release polymer.--Copyright 1974, Biological Abstracts, Inc.
W74-12691

EFFECT OF CORN STOVER ON PHOSPHORUS IN RUN-OFF FROM NONTILLED SOIL,
Guelph Univ. (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 3F.
W74-12722

THE LACK OF INORGANIC REMOVAL OF DISSOLVED SILICA DURING RIVER-OCEAN MIXING,
University of South Florida, St. Petersburg. Marine Science Inst.
K. A. Fanning, and M. E. Q. Pilson.
Geochim Cosmochim Acta. Vol 37, No 11, p 2405-2415, 1973.

Descriptors: *Rivers, *Estuaries, *Sediments, Oceans, Interfaces, *Saline water-freshwater interfaces, *Inorganic compounds, *Silica, Flumes, *Fluvial sediments, Suspended solids, *Sediment transport, Water pollution control.
Identifiers: Orinoco, Venezuela, Savannah River, Mississippi River, Plumes.

The significance of the inorganic removal of dissolved silica from estuarine zones was investigated at 3 river mouths: the Orinoco (Venezuela), the Savannah and the Mississippi. Particular attention was given to the Mississippi river plume, where extensive inorganic silica uptake had been reported. Mixing curves and laboratory dilution experiments provided little evidence that the phenomenon was widespread,. Because of an uncertain fresh water tie point, some inorganic uptake could not be completely ruled out for the Orinoco, but, in the plumes of the Savannah and Mississippi rivers, no inorganic silica removal was indicated. In contrast to published experiments on river sediments, laboratory dilution studies on suspended matter from the Mississippi river showed release of dissolved silica instead of uptake.--Copyright 1974, Biological Abstracts, Inc.
W74-12724

EPIDEMIOLOGICAL ASPECTS OF THE PROBLEM OF SANITARY PROTECTION OF BODIES OF WATER, (IN RUSSIAN),
D. P. Nikitin.
Gig Sanit. Vol 37, No 12, p 61-63. 1972.

Descriptors: *Public health, *Diseases, Epidemiology, Environmental sanitation, Sanitary engineering, *Water supply, Infection, Protection.

A major role should be played by scientists and practical workers of the sanitary and epidemiological services in solving problems related with the use of funds allocated for environmental protection, particularly protection of bodies of water. In so doing they should concentrate on routine sanitary inspection. The successful implementation of measures to protect water will be a major contribution to the solution of the general problem of the prevention of intestinal infections in the country.--Copyright 1973, Biological Abstracts, Inc.
W74-12748

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

COMPUTER USES IN WATER SYSTEMS: CONFERENCE REPORT.
Water Research Association, Marlow (England).
A Water Research Association Conference, University of Reading, England, 25-27 September 1973. 53 p, 15 fig, 6 ref, 1 append.

Descriptors: *Conferences, Computers, *Water resources development, *Information retrieval, *Water pollution control, *Data storage and retrieval.

The Water Research Association Conference of September 1973 dealt with the use of computers in the management, analysis, planning and design of water resource systems. A broad range of topics in both the water and computing fields were covered, and numerous data processing, simulation and optimization techniques were presented together with computer programs and models. Contained within this Conference Report are: STORET, the Environmental Protection Agency's computerized information system for defining cause and effect relations in water pollution; a summary of the discussions which took place during the Conference sessions, motivated by the invited Conference papers; the closing address; and an appendix comprised of the names and associations of the delegates attending the Conference. (See W74-12108 thru W74-12147) (Bell-Cornell)
W74-12107

STORET-THE EPA WATER QUALITY DATA SYSTEM,
Environmental Protection Agency, Washington, D.C.
C. S. Conger.
In: Computer Uses in Water Systems: Conference Report. A Water Research Association Conference, University of Reading, England, p 1-20, 25-27 September 1973. 15 fig.

Descriptors: Computers, *Information retrieval, *Water pollution control, *Data storage and retrieval.

STORET is the Environmental Protection Agency's computerized information system serving over two hundred remote locations. The system attempts to define the cause and effect relationships in water pollution. Described are the system and the form of the data identifiers. The system is based on two files: the water quality file and the General Point Source File. The methods of addressing the data base are outlined and examples of various retrievals are given. The paper concludes with a brief indication of proposed future developments. (See W74-12107) (Bell-Cornell)
W74-12108

COMPUTER USES IN WATER SYSTEMS: CONFERENCE PAPERS.
Water Research Association, Marlow, (England).
A Water Research Association Conference, University of Reading, England, 25-27 September 1973. 308 p, 57 fig, 15 tab, 41 equ, 160 ref.

Descriptors: Computers, *Water resources, *Management, *Systems analysis, Data processing, Simulation analysis, Optimization, Computer models, Computer programs, Economics, Forecasting, Planning, Hydrology, River basins, Reservoirs, Lakes, Telemetry, Water treatment, Water quality control, Water supply, Water distribution(Applied), Mathematical models, Industries.
Identifiers: Regional water authorities, *United Kingdom.

This volume contains sixteen conference papers which deal with the use of computers in the management, planning, and analysis of water resource systems. These articles cover a broad range of topics in both the water and computing fields. Numerous simulation, optimization, and data processing techniques are presented. Included are such subjects as computer based management systems, management information in the water industry, computer and systems analysis applications to water resource planning, water quality monitoring, computer investigations of lake water movements, remote control of a water system using an on-line mini computer, computers in structural design, a process/financial computer modeling. These sixteen articles represent a comprehensive overview of the role being played by computers within the water industry, primarily in Great Britain. (See W74-12107) (Bell-Cornell)
W74-12109

COMPUTER BASED MANAGEMENT SYSTEMS--OPPORTUNITIES IN THE NEW ORGANIZATION,
R. M. B. Kenyon.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 1-10, 25-27 September 1973.

Descriptors: *Organizations, Computers, *Management, *Benefits, Water resources, Planning, Methodology, Economics, Regional development, *Regional analysis.
Identifiers: *Regional Water Authorities, Data.

The formation of new, larger organizations presents numerous opportunities to obtain benefits from the use of computer based management systems. These systems will have an impact upon all aspects of the new organization, for example, in resource planning, quality control, distribution, and design, as well as providing scope for benefits in other areas such as administration, accounting, and financial planning. Considered is the introduction of computer based management systems in the new Regional Water Authorities. Discussed are the opportunities for benefits or improvements which are available and how new systems should be developed to achieve the goals and to avoid pitfalls and consequent disappointments. Application of computer systems in specific areas is not dealt with here. Description is given of the main features of computer based management systems; this is then linked to the sections on opportunities by examining briefly the relevant aspects of the new authorities. Finally, the problems of development are discussed and a planning method is recommended. Successful changeover to computer based management systems necessitates hard work and careful planning, the main steps being: (1) audit present position and establish future needs; (2) simulate means of satisfying needs; and (3) prepare blueprint for implementation. (Seealso W74-12107) (Bell-Cornell)
W74-12110

MANAGEMENT INFORMATION IN THE WATER INDUSTRY,
Sunderland and South Shields Water Co. (Ontario).
For primary bibliographic entry see Field 4A.
W74-12111

PROCESS/FINANCIAL MODELS,
J. N. Firth, and A. M. Sutton.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 29-39, September 1973. 3 fig.

Descriptors: *Mathematical models, *Computer models, Computer programs, Industries, Control, Planning, Economics, Evaluation, Estimating, Systems analysis.
Identifiers: *Financial models, Process evaluation, Comprehensive modeling.

The concepts of mathematical model building are introduced and extended to include financial computer models. The general nature of these models and their use are investigated. Financial models are a sub-set of mathematical models, expressing relationships in monetary terms. Developed is a unique extension of financial models to include physical aspects, process yields, etc. In its most complex form a financial model is a complete control and planning system based on computer models. The four types of these are: those run in batch or time sharing, and those constructed using a financial language or a multi-purpose language such a FORTRAN. Two specific models, representing the extremes of financial model building, are discussed in detail. The first, a simple budget model built in a financial language, SIMSTRAT, calculates the gross profit and percentage increase in gross profit over the first period. The second is a generalized process model written in FORTRAN. This model, used extensively in London and Mexico, is designed to evaluate chemical and steel plants and other production systems. Considered are the possible applications of these techniques within the water industry. (See also W74-12007) (Bell-Cornell)
W74-12112

AN INTEGRATED MODEL FOR THE PLANNING AND OPERATION OF WATER SYSTEMS,
Water Research Association, Marlow, (England). Economics Group.
T. Wyatt.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, 25-27 September 1973, p 41-71. 29 p, 5 fig, 4 tab, 24 ref.

Descriptors: *Water resources development, *Planning, *Analytical techniques, *Multiple-purpose, *Operation and maintenance, Mathematical models, Costs, Resource allocation, Time, Water distribution(Applied), Networks, Design, Water storage, Water demand, Simulation analysis, Optimization, Systems analysis, Comprehensive planning, Regional analysis.
Identifiers: Cost minimization.

Analytical techniques have been developed in various problem areas of the water resources field. A brief review is made of three such areas: (1) water resource systems incorporating long-term storage for planning and operation, herein considering simulation and optimization techniques; (2) resource allocation to multiple demand areas, discussing allocation subject to short-term constraints and nonlinear power tariffs; and (3) water distribution systems, considering least-cost design of distribution networks. These are defined in terms of objectives, constraints, and the decision time span involved. The degree of interaction between these sub-areas is discussed and ways in which such dependence might be accomodated in light of present expertise are considered. In-

creased regionalization, conjunctive and multi-purpose use promote this interaction between problem areas which must be modeled for global system optimization. Mathematical models should be developed within the overall framework of a total integrated water system model with due consideration of the financial links involved in the management process. (See also W74-12107) (Bell-Cornell)
W74-12113

SYSTEMS AND TECHNIQUES FOR RESOURCE PLANNING,
Water Resources Board, Reading (England).
V. K. Collinge.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, p 73-103, 25-27 September 1973. 7 fig, 8 ref.

Descriptors: *Water resources, *Regional analysis, *Analytical techniques, *Comprehensive planning, Data processing, Hydrologic data, River flow, Resource allocation, Economics, Investment, Timing, Simulation analysis, Groundwater, Multiple-purpose reservoirs, Control, Mathematical models, Systems analysis.
Identifiers: England, National planning, Mixed integer programming.

The development background of computer-based techniques to aid regional and national planning of water resources is outlined. Examined in detail are the main features of these types of analyses. The development of a system for processing and archiving river flow data is described. Planning techniques evolved by the Board are then described; future data needs and the tasks facing the new Data Collection Unit are indicated. Resource planning techniques and objectives, with respect to allocation and costing, are described and illustrated through reference to the Trent Economic Model. Description of the Model includes that of the river, the allocation, and the timing of investment models, together with the way in which these models interact. Finally, examples of planning and operational models are given in three appendices. The first of these deals with a simulation technique for evaluation of a regional water resource system, the second with the South Downs groundwater model, and the third with short-term control strategy for multi-purpose reservoir systems. (See also W74-12107) (Bell-Cornell)
W74-12114

SYSTEMS ANALYSIS IN WATER RESOURCE PLANNING IN THE USA,
Geological Survey, Washington, D.C. Water Resources Div.
E. D. Attanasi.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, p 105-127, September 1973. 2 tab, 61 ref.

Descriptors: *Water resources, *Planning, *Systems analysis, *Analytical techniques, *Surveys, Computers, Evaluation, Value, Comprehensive planning, *United States, Optimization, Simulation analysis, Mathematical models, Economics, Hydrology, Forecasting.

A heuristically-based survey of computer and systems analysis applications to water resource planning is presented. Systems techniques are considered in terms of their application to the establishment of economic, social, physical and hydrologic relationships, to forecasting values of planning variables, and to evaluating, via simulation or optimization, alternative policies in terms of system performance. Specific techniques are reviewed briefly. A general appraisal of methods of construction and 'validation' of systems models is made. Presented is a tabular survey of special applications of computer modeling and optimization techniques; selected hydrologic, physical, economic and social modeling efforts and alternative optimization and decision models are reviewed. An assessment is made of the impact of computer and systems analysis applications to water resource planning. A summary of previous criticism is also presented. The concluding discussion suggests how these methodological issues may dictate the direction of future research. (See also W74-12107) (Bell-Cornell)
W74-12115

FORECASTING POLLUTION IN RIVERS, ESTUARIES AND THE SEA,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5B.
W74-12116

ASPECTS OF MONITORING AND CONTROL OF WATER QUALITY,
Great Ouse River Authority (England).
For primary bibliographic entry see Field 5A.
W74-12117

COMPUTER INVESTIGATIONS OF WATER MOVEMENTS IN LAKES.
For primary bibliographic entry see Field 2H.
W74-12118

STUDY RELATING TO THE USE OF A PROCESS CONTROL COMPUTER FOR A WATER TREATMENT PLANT IN FRANCE,
Compagnie Generale des Eaux, Paris (France).
For primary bibliographic entry see Field 5F.
W74-12119

COMPUTER USE IN US WATER AUTHORITY,
Chicago Dept. of Water and Sewers, Ill.
For primary bibliographic entry see Field 5F.
W74-12120

REMOTE CONTROL OF A WATER SYSTEM USING AN ON-LINE MINI COMPUTER,
East Worcestershire Waterworks Co. (England).
For primary bibliographic entry see Field 7C.
W74-12121

AN INTRODUCTION TO COMPUTER INFORMATION SYSTEMS IN DISTRIBUTION,
For primary bibliographic entry see Field 4A.
W74-12122

COMPUTERS IN STRUCTURAL DESIGN,
Constructional Industry Research and Information Association, London (England).
For primary bibliographic entry see Field 8A.
W74-12123

USE OF COMPUTERS BY THE CONSULTING ENGINEER IN THE DEVELOPMENT OF WATER RESOURCES,
W. Pemberton.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 283-294, 25-27 September 1973. 1 ref, 2 append.

Descriptors: *Water resources development, Computers, *Environmental engineering, *Computer programs, *Hydrologic data, Benefits, Planning, Data processing, Hydraulics, Simulation analysis.

Discussed is the use of computers by consulting engineers in the water resources field; considered is the effect of this use upon their organization and management systems. The obvious and secondary benefits of computer use are mentioned. The use of computers to rationalize documentation and in the digital simulation of water resource systems is discussed. The possible future development of GENESYS sub-systems to cover water resources problems is considered; an outline of a possible, simple sub-system for processing hydrological data is given. (See also W74-12107) (Bell-Cornell)
W74-12124

RECENT DEVELOPMENTS IN COMPUTING SYSTEMS AND REMOTE TERMINALS,
P. F. Windley.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 295-308, 25-27 September 1973.

Descriptors: Computers, *Water resources, Industries, *Control, *Data transmission, *Data processing, Operation and maintenance, Benefits, Planning, Management, Communication.
Identifiers: Information, Regional Water Authorities(England), Bureaus.

Until a short while ago, the characteristics of computers were restrictive in applications to water problems; particular difficulties were experienced with delays in communicating with the computers. Recent developments however, especially in data transmission, have removed many of these difficulties and now enable the economic provision of computing services and of computer-based information services to dispersed organizations, such as the new Regional Water Authorities (RWA's). This paper discusses how current developments in computing services can help serve the re-organizing water industry in England. Considered are mini-computers, terminals, the commercial scene, databases and database management systems, software packages, technical systems, and computer selection. The author envisages the day when each RWA will have a centralized large computer on which will be based not only the 'classic' computer applications of accounting, payroll and project control, but also information services for strategic planning and day-to-day control and technical services for engineers and planners. (See also W74-12107) (Bell-Cornell)
W74-12125

COMPUTER USES IN WATER SYSTEMS: CONTRIBUTED PAPERS.
Water Research Association, Marlow (England).
A Water Research Association Conference, University of Reading, England, 25-27 September 1973. 110 p, 38 fig, 3 tab, 29 equ, 27 ref.

Descriptors: Computers, *Water resources development, *Systems analysis, Management, Simulation analysis, Optimization, *Computer programs, *Computer models, Data processing, Planning, Design, Hydrology, Water pollution control, Water distribution(Applied), Networks, Reservoirs, Rivers, Lake Erie, Economics, Water chemistry, Finite element analysis, Dynamic programming.
Identifiers: River authorities, *United Kingdom.

This is a supplement to the volume which contains invited Water Research Association Conference papers. Comprised herein, however, are 22 short articles which were contributed to the Conference. They deal with the use of computers in the management, analysis, planning and design of water resource systems and cover a broad range of topics in both the water and computing fields. Numerous data processing, simulation and optimization techniques are presented together with computer programs and models. Included is the use of computers in such areas as integrated hydrometric data processing by a river authority, public health engineering, reservoir scheme yield assessment, river regulation scheme design, time-sharing for water resources planning, wind driven circulation in shallow lakes, prediction of ammoniacal nitrogen, analysis and design of water distribution

systems, the start-up model of a rapid sand filter, and the development of a national library of GENESYS programs. These 22 articles represent a comprehensive overview of the role being played by computers within the water industry, primarily in Great Britain, and are a rich supplement to the volume containing invited Conference papers. (See also W74-12107) (Bell-Cornell)
W74-12126

A CASE STUDY OF THE SUSSEX/KENT RIVER AUTHORITIES' INTEGRATED HYDROMETRIC DATA PROCESSING SYSTEM,
Sussex River Authority (England).
For primary bibliographic entry see Field 7C.
W74-12127

TECHNICAL COMPUTER SYSTEMS,
Mersey and Weaver River Authority (England).
D. Sherlock, and E. Tongue.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 5-9, 25-27 September 1973.

Descriptors: Computers, Analysis, *River basin commissions, Hydrometry, Management, Reservoirs, Conjunctive use, Rainfall, Computer programs, Backwater, Curves, Frequency analysis, Information retrieval.
Identifiers: Technical problems, Conveyance curves, Information, Abstraction licenses, *United Kingdom.

Discussed is the development of the application of computer systems to technical problems by the Mersey and Weaver River Authority. Following the Authority's inception, the basic information relating to abstraction licenses was put on computer file. The range of analyses of hydrometric data was extended and programs were developed for use in hydraulic design calculations. An ICL 1901A computer comprises the central processor; magnetic tapes have recently been added. The range of technical applications in use at present is outlined, including: backwater and conveyance curves; surveying; river flow analysis; rainfall analysis; frequency analysis; state-discharge calculations; experimental catchment; reservoir and conjunctive-use programs; and abstraction licence analyses. The last two applications are discussed in more detail. Described is a minimum ranking program developed for use either in reservoir design or in conjunctive use schemes; the program calculates from main daily flows and limitations on abstractions, such as prescribed flows, etc., the quantity of water which may be abstracted during each day. The licence file has been expanded and is designed to contain information required for a variety of purposes by different departments of the Authority. It is now a management system rather than a simple technical application. (See also W74-12107) (Bell-Cornell)
W74-12128

COMPUTER SERVICES AND APPLICATION IN THE GREATER LONDON COUNCIL'S DEPARTMENT OF PUBLIC HEALTH ENGINEERING,
Greater London Council (England). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 5G.
W74-12129

PROPOSED KIELDER WATER RESERVOIR SCHEME COMPUTER APPLICATION IN YIELD ASSESSMENT,
Northumbrian River Authority (England).
For primary bibliographic entry see Field 4A.
W74-12130

GENERAL ENGINEERING COMPUTER USE AT THE WELLAND AND NENE RIVER AUTHORITY,
Welland and Nene River Authority (England).
For primary bibliographic entry see Field 4A.
W74-12131

THE DESIGN OF A TWO-RESERVOIR RIVER REGULATING SCHEME,
South Staffordshire Waterworks Co. (England).
For primary bibliographic entry see Field 4A.
W74-12132

THE USE OF A COMMERCIAL TIME-SHARING COMPUTER FOR WATER RESOURCE PLANNING,
Severn River Authority (England).
T. Kitson.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 35-38, 25-27 September 1973. 1 fig.

Descriptors: Computers, *Data processing, *Water resources, *Planning, Computer models, *Computer programs, Data collections, Projects, Reservoir operation, Simulation analysis, River regulation, River flow, Costs, Systems analysis.
Identifiers: Time-sharing computers, Batch facilities, Commercial bureaus, Predicting.

This brief paper describes the use by the Servern River Authority of a commercial bureau which offers batch, time-sharing, and remote job entry facilities. A number of sub-systems are used to insure mixed mode operation of the three facilities. Two examples of the type of water resource planning projects undertaken are discussed: reservoir simulation studies and river regulation studies. The costs of using the facilities are considered. It is concluded that a commercial bureau provides planners with a sophisticated computer installation which is almost continuously available without the commitment to expensive equipment, specialist personnel or office equipment. (See also W74-12107) (Bell-Cornell)
W74-12133

WATER RESOURCE DEVELOPMENT SYSTEM,
Cornwall River Authority, Launcestor (England).
For primary bibliographic entry see Field 4A.
W74-12134

A GENERAL PURPOSE DIGITAL MODEL OF A WATER RESOURCE SYSTEM,
Leicester Univ. (England). Dept. of Engineering.
A. C. Tory.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 52-55, 25-27 September 1973. 5 fig.

Descriptors: *Computer models, *Computer programs, *Digital computers, *Water resources, Hydrologic data, Engineering, Systems anslysis.
Identifiers: Model building, Operating rules.

A computer package, designed to enable the water resources engineer to produce a reliable model with the minimum of programming effort, is described. In constructing a model, the physical system must be expressed operationally; a system diagram and a data file are shown. The heart of the model is contained within the function FLOW; the sources of hydrological data are specified within the function HYDRO. Limitations and future developments of the package are discussed. (See also W74-12107) (Bell-Cornell)
W74-12135

THE APPLICATION OF A SIMULATION MODEL TO THE PLANNING AND MANAGEMENT OF WATER RESOURCES IN LANCASHIRE,
Lancashire River Authority (England).
For primary bibliographic entry see Field 4B.
W74-12136

COMPUTER ASSISTED QUANTITATIVE SPECTROGRAPHIC ANALYSIS,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 5A.
W74-12137

WIND DRIVEN CIRCULATION IN SHALLOW LAKES: A FINITE ELEMENT APPROACH,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 2H.
W74-12138

COMPUTER APPLICATIONS IN WATER QUALITY MODELLING: PREDICTION OF AMMONIACAL NITROGEN IN THE RIVER THAMES,
EASAMS, Camberley (England).
For primary bibliographic entry see Field 5B.
W74-12139

COMPUTER AIDED ECONOMIC DESIGN OF WATER DISTRIBUTION SYSTEM,
University Coll., London (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-12140

THE COMPUTER SIMULATION OF THE OPERATION OF A BANK OF RAPID GRAVITY FILTERS,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 5D.
W74-12141

COMPUTER ORIENTED APPROACH OF A WATER DISTRIBUTION SYSTEM,
National Inst. of Scientific Research, Quebec.
For primary bibliographic entry see Field 4A.
W74-12142

AN INVESTIGATION OF THE OPTIONAL ON-LINE CONTROL OF A WATER SUPPLY NETWORK,
Cambridge Univ. (England). Engineering Lab.
For primary bibliographic entry see Field 4A.
W74-12143

LAY-OUT AND DIAMETER OPTIMIZATION FOR A LOOPED WATER TRANSPORTATION NETWORK,
Municipal Water Works of Rotterdam (Netherlands).
For primary bibliographic entry see Field 4A.
W74-12144

ANALOGUE AND HYBRID METHODS FOR THE ANALYSIS AND PLANNING OF WATER DISTRIBUTION NETWORKS,
Ring-Belt Ltd. (West Germany); and Montan-Forschung (West Germany).
For primary bibliographic entry see Field 4A.
W74-12145

THE START-UP MODEL OF A RAPID SAND FILTER,
Philips Forschungslaboratorium G.m.b.H., Hamburg (West Germany).
For primary bibliographic entry see Field 5F.
W74-12146

DEVELOPING A NATIONAL LIBRARY OF PROGRAMS USING GENESYS,
Loughborough Univ. of Technology (England). Genesys Centre.
R. J. Allwood.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 105-110, 25-27 September 1973. 1 fig, 2 ref.

Descriptors: Computers, *Computer programs, Engineering, *Libraries.

In the utilization of computers for engineering, the similar problems which must be faced by both programmers and users are discussed. For example, many programs will work only on the computer used for the initial development, and often can be understood of used only by the original author. This is tolerable with small programs; but with progress in electronics, more sophisticated and larger programs are being developed. It then follows to ask whether the programming tools of the 60's are suitable for developing such complex, substantial programs. The creation of GENESYS and the establishment of the Genesys Centre provide solutions to these problems. The advantages of this program and Centre for both user and programmer are discussed in detail. GENESYS uses a machine-independent language which is easily translatable into a version of FORTRAN suitable for the particular computer being used. The library of engineering programs needs only to be written once and is available on many types and sizes of computer, at many computing centres throughout the country. The Genesys Centre acts as the focal point for the development and supply of programs. To promote use of GENESYS, the Centre: (1) maintains and distributes programs; (2) provides publicity and education; and (3) develops a library. GENESYS is a commercial venture. (See also W74-12107) (Bell-Cornell)
W74-12147

UPPER WABASH SIMULATION MODEL. PROGRAM DOCUMENTATION AND EXTENSION,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 4A.
W74-12197

WEBER RIVER BASIN INCLUDING DAVIS COUNTY AND THE OGDEN S.M.S.A.: WATER QUALITY MANAGEMENT PLANNING, PHASE I--PROGRAM DESIGN.
Stevens, Thompson and Runyan, Inc., Portland, Oreg. and Nielsen, Maxwell and Wangsgard, Inc., Salt Lake City, Utah.
Utah State Division of Health, Salt Lake City, February 1973. 57 p, 4 fig, 3 tab.

Descriptors: *Planning, *Regional analysis, *River basin development, *Utah, *Watershed management, *Water quality control, River basins, Water Quality Act, Federal Water Pollution Control Act, Cities, Long-term planning, Project planning, Studies.
Identifiers: *Weber River Basin, Area-wide planning, Metropolitan planning.

A program design is presented for water quality planning in the entire Weber River Basin, including both metropolitan areas and non-metropolitan areas within Weber County and Davis County, Utah. The metropolitan areas includes portions of the Ogden and Salt Lake City Standard Metropolitan Statistical Areas. This first phase study is an attempt to define the program clearly. Phase I consists of the following elements: physical description of the planning area, goals and objectives, statement of problem, status of basin planning, and a description of the water quality planning program. The latter is subdivided into program management, program design, planning coordination, funding and budget. Brief descriptions of individual tasks comprising the planning program are provided in the Program Design section. A task numbering system has been adopted to follow the logic of the planning process. The nine major tasks suggested are: (1) program definition and design, (2) program management, (3) community involvement and information, (4) data system, (5) system requirements, (6) synthesis of alternative systems, (7) analysis of alternative systems, (8) evaluation of alternative systems and selection of a preferred system, and (9) implementation plan. Phase II of the program will provide budget cost estimates and recommendations for finalizing of funding and assignments of tasks. Phase III will be development of the water quality management plan for the Weber River Basin. Phase IV will be development of the metropolitan water quality management plans for the Ogden SMSA and Davis County. (Poertner)
W74-12238

LEGAL PROBLEMS IN WATER POLLUTION CONTROL,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 6E.
W74-12239

CHATTANOOGA AREA REGIONAL COUNCIL OF GOVERNMENTS COMPREHENSIVE WATER AND SEWER STUDY: HAMILTON, WALKER AND CATOOSA COUNTIES, BOOK TWO.
Hensley-Schmidt, Inc., Chattanooga, Tenn.
Chattanooga Area Regional Council of Governments, Chattanooga, Tennessee, December 1971. 192 p, 39 fig, 9 tab. Tennessee P-131.

Descriptors: *Planning, *Water supply development, *Sewerage, *Regional analysis, *Georgia, *Tennessee, Waste water treatment, Long-term planning, Municipal water, Municipal wastes, Urbanization, Comprehensive planning.
Identifiers: *Chattanooga(Tennessee).

A comprehensive regional water supply and sewerage plan was developed for a three-county area surrounding Chattanooga, Tennessee. The study area included Walker and Catoosa Counties in Georgia and Hamilton County, Tennessee. Efforts to expand opportunities and solve problems within the region are underway through a comprehensive planning program which includes regional studies of housing, land use, transportation, parks, recreation, open space, solid waste disposal, water and sewerage. In recent years, many local governments have initiated independent studies and developmental programs to meet the water and sewerage needs of their citizens. However, to date no study has been made of the entire area with a view toward coordinating and meeting both present and future needs. Because water and sewerage systems are closely related to the topographic features of an area, rather than political boundaries, it is important to consider providing these services on a regional basis if the most beneficial and compatible land use and water resources conservation are to be attained. Based on findings, specific recommendations deal with the development of a comprehensive plan for water and sewerage facilities for the three-county area. (Poertner)
W74-12242

MULTILEVEL OPTIMIZATION FOR CONJUNCTIVE USE OF GROUNDWATER AND SURFACE WATER,
Case Western Reserve Univ., Cleveland, Ohio. Systems Research Center.
For primary bibliographic entry see Field 4B.
W74-12296

PLANNING AND HUMAN VALUES - AN INQUIRY INTO THE PHENOMENON OF URBAN GROWTH AND THE POSSIBILITY OF ITS CONTROL THROUGH WATER AND LAND RELATED ACTIONS,
Abt Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W74-12354

CAPACITY OF WATER-BASED RECREATION SYSTEMS PART II: A SYSTEMS APPROACH TO CAPACITY ANALYSIS,
North Carolina State Univ., Raleigh. Dept. of Recreation Resources Administration.
For primary bibliographic entry see Field 6B.
W74-12364

6B. Evaluation Process

INTERREGIONAL IMPACTS OF ALTERNATIVE WATER POLICIES FOR IRRIGATION IN WESTERN UNITED STATES,
Wisconsin Univ., Madison. Dept. of Agricultural Economics., and Wisconsin Univ., Madison. Dept. of Forestry.
For primary bibliographic entry see Field 3F.
W74-12002

EFFLUENT MANAGEMENT INFORMATION SYSTEM (EMIS),
Development Sciences, Inc., East Sandwich, Mass.
For primary bibliographic entry see Field 5G.
W74-12082

AN INTEGRATED MODEL FOR THE PLANNING AND OPERATION OF WATER SYSTEMS,
Water Research Association, Marlow, (England). Economics Group.
For primary bibliographic entry see Field 6A.
W74-12113

SYSTEMS ANALYSIS IN WATER RESOURCE PLANNING IN THE USA,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 6A.
W74-12115

A Q-METHODOLOGICAL STUDY OF ATTITUDES TOWARD WATER RESOURCES AND IMPLICATIONS FOR USING MASS MEDIA IN DISSEMINATION OF WATER RESEARCH RESULTS,
Missouri Univ., Columbia. Water Resources Research Center.
R. R. Kahle, and R. L. Lee.
Available from the National Technical Information Service as PB-235 859 $8.00 in paper copy, $2.25 in microfiche. Partial Completion Report, (1974). 349p, 5 fig, 23 tab, 160 ref, 8 append. OWRT X-127(3756)(1).

Descriptors: *Attitudes, *Communication, *Information exchange, *Social aspects, *Public opinion, *Publications, Psychological aspects, Motivation, Human behavior, Rural sociology, Social sciences, Questionnaires, Applied psychology, Public relations, Behavior, Social behavior, Editing, Reviews, Television, *Missouri, Films, Correlation analysis.
Identifiers: *Q-Methodology study, Radio, Newspapers, *Mass communication, *Dissemination of information, *Factor analysis, Religion, Abduction, Depth interviews, Beliefs, Extension service, News media, Attitude scaling, Psychometrics.

To analyze audience attitudes, a Q-study of attitudes toward water resources in Missouri was undertaken. Four basic attitude types were isolated: 'Ecologically Aware,' 'Farmers' Advocates,' 'Rural Optimists,' and 'Optimistic

Professionals.' The study further showed how this attitude information could be applied to designing a dissemination of information program utilizing the mass media, with special attention to radio and newspapers. Among the demographic variables that were found most pertinent to water resources attitude patterns were relious affiliation, age, and residence (urban, town, or rural). A replication of Costantini and Hanf's Environmental Awareness Scale failed to be internally reliable when transplanted to Missouri. However, the four basic attitude patterns closely resemble the four lemma clusters described by Courtland Smith in an Oregon study.
W74-12192

ESTIMATING RESERVOIR RECREATIONAL VISTS IN INDIANA,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
K. K. Wolka, and G. H. Toebes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 818, $4.50 in paper copy, $2.25 in microfiche. Technical Progress Report No 48, June 1974, 99 p, 8 tab, 24 fig, 21 ref, 5 append. OWRT-A-026-IND(3).

Descriptors: *Recreation, *Access routes, *Lakes, *Multiple purpose projects, *Reservoir operations, Water sports, Swimming, Boating, Recreation demand, Reservoirs, Transportation, Statistical models, Correlation analysis, *Indiana, *Estimating.
Identifiers: *Population centers, *Origin-Destination models, Recreation Standard models, Network models, Forecasting models, Causal models.

A prediction model was developed to estimate the expected number of recreational vists to Federal reservoirs in Indiana. To this end an elementary origin-destination model was amended in several ways. The ultimate purpose in constructing the simulation model was its possible use for evaluation purposes of benefits from different types of water resources development. The two main project benefits are flood control and recreation. An evaluation of the recreation benefits requires an estimate of the expected future visitation based on Indiana data. This estimation method is the subject of the report. The method is an improvement over existing models in that a network approach was followed. Further work is needed to adjust the model. The absence of some constraints for the selection of which data are not yet available, caused several unacceptable prediction results. (See also W74-12197)
W74-12196

AN INVESTIGATION OF FACTORS AFFECTING THE RECREATIONAL USE OF STATE PARKS,
Maryland Univ., College Park. Water Resources Research Center.
J. Volk, and A. O'Neill.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 819, $4.00 in paper copy, $2.25 in microfiche. Technical Report 27, (1974). 81 p, 6 tab, append. OWRT A-008-MD(1), 14-01-0001-790.

Descriptors: *Recreation, *Recreation demand, *State parks, *Recreation facilities, Planning, Attitudes, Social aspects.

The distance of a recreation facility from potential users does exert an important influence on the intensity of use which a facility receives. The exact nature of this influence varies somewhat depending on the nature of the creation area, but is in all cases the dominant influence. With no information other than the distance of recreation area from blocks of potential users, a fairly reliable estimate of the relative intensity of use can be derived. Some information concerning the type and quality of the recreation area under consideration is necessary if these attendance-distance relationships are to be used for predictive purposes. Further studies with different types of recreation areas should help define more precisely differences in the attendance-distance relationship with differing kinds of recreation are as. Quality and uniqueness of the recreation area are important factors to consider when looking at the attendance-distance relationship. It is desireable to locate many types of recreation facilities where they will be accessible to large numbers of people. Most large metropolitan areas are in need of more easily accessible recreation. Recreation planners and other resource planners must keep in mind the importance of accessibility when considering resource investments which have recreational potential. If accessibility is not given major attention in the planning process, the result will be a smaller return on resource investments than would otherwise be possible.
W74-12198

ECONOMIC EFFECTS OF SUBSIDIES FOR WASTE ABATEMENT,
Clemson Univ., S.C. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-12199

MULTIPURPOSE WATER RELATED DEVELOPMENT IN URBAN AREAS,
California Univ., Berkeley. Hydraulics Lab.
For primary bibliographic entry see Field 4A.
W74-12226

WATERSHED VALUES IMPORTANT IN PLANNING,
Forest Service (USDA), Franklin, N.C. Southeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W74-12230

WATER SUPPLY AND WATER POLLUTION CONTROL CAPITAL PROGRAM 1972-1985.
Delaware Valley Regional Planning Commission, Philadelphia, Pa.
For primary bibliographic entry see Field 6E.
W74-12233

PERCEPTION OF WATER QUALITY BY SELECT RESPONDENT GROUPINGS IN INLAND WATER-BASED RECREATIONAL ENVIRONMENTS,
Rensselaer Polytechnic Inst., Troy, N.Y. Freshwater Inst.
For primary bibliographic entry see Field 5G.
W74-12287

SOME EVIDENCE OF ECONOMICS OF SCALE IN HAWAIIAN SUGAR PLANTATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 3F.
W74-12344

WATER RESOURCES PROTECTION MEASURES IN LAND DEVELOPMENT - A HANDBOOK,
Delaware Univ., Newark. Water Resources Center.
For primary bibliographic entry see Field 5G.
W74-12352

SOCIO-ECONOMIC IMPACT OF ESTUARINE THERMAL POLLUTION,
MetroStudy Corp., Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-12353

PLANNING AND HUMAN VALUES - AN INQUIRY INTO THE PHENOMENON OF URBAN GROWTH AND THE POSSIBILITY OF ITS CONTROL THROUGH WATER AND LAND RELATED ACTIONS,
Abt Associates, Inc., Cambridge, Mass.
O. A. Salama.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 035, $5.75 in paper copy, $2.25 in microfiche. Completion Report, April 1974. 219 p, 3 append. OWRT C-4161(No. 9026)(1).

Descriptors: *Methodology, *Decision making, *Social aspects, *Social impacts, *Social values, *Comprehensive planning, Land use, Zoning, Attitudes, Urbanization, Evaluation, Water policy.
Identifiers: Urban growth, Resistance to urban growth, Community goals, Latent shortage.

Three instruments were designed and implemented to measure the effectiveness of water as a resource to control urban growth. The instruments were applied in varying degrees to forty urban communities whose water supply was unable or has been exactly able to keep up with the demand for water. The data was then used as an input for the development of a procedure for multiple objectives planning, which has utility in the evaluation of any specific water development project involving opposing attitudes toward growth in the affected urban communities.
W74-12354

PRIMARY DATA ON ECONOMIC ACTIVITY AND WATER USE IN PROTOTYPE OIL SHALE DEVELOPMENT AREAS OF COLORADO: AN INITIAL INQUIRY,
Colorado State Univ., Fort Collins. Dept. of Economics.
S. L. Gray.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 039, $3.00 in paper copy, $2.25 in microfiche. Colorado Environmental Resources Center, Fort Collins, Completion Report No 58, June 1974. 8 p. OWRT A-024-COLO(1). 14-01-0001-4006.

Descriptors: *Colorado, *Water utilization, Oil shales, Economics, *Community development, *Economic prediction, *Income distribution.
Identifiers: *Oil shale development, Economic structure.

Potential impacts of oil shale development on the economies of certain Western Slope communities in Colorado are quite large. These impacts will likely exert a substantial pressure on the land and water resource lease of the area in addition to the effects upon community development, regional income, income distribution, and a changing mix of business activity. In order to approach future research on these issues this 'seed' research effort was designed to (1) promote interaction and interchange of ideas among researchers and members of the affected communities, (2) to identify important areas of research needs in the oil shale region, and (3) to initialize the collection of primary data depicting the economic structure of the oil shale communities.
W74-12356

METHODS FOR TRANSFERRING WATER RESOURCES RESEARCH FINDINGS TO PRACTICING ENGINEERS,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 10D.
W74-12363

CAPACITY OF WATER-BASED RECREATION SYSTEMS PART II: A SYSTEMS APPROACH TO CAPACITY ANALYSIS,
North Carolina State Univ., Raleigh. Dept. of Recreation Resources Administration.
G. A. Hammon, H. K. Cordell, L. W. Moncrief, M. R. Warren, and R. A. Crysdale.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 069, $3.25 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Completion Report, (UNC-WRRI-74-90), Report No. 90, July, 1974. 46 p, 6 fig, 1 tab. OWRT B-013-NC(4). 14-01-0001-1936.

Descriptors: Recreation, Boating, Skiing, Fishing, *Systems analysis, Recreation facilities, Lakes, Model studies, Simulation analysis, *Recreation demand, *North Carolina, Attitudes.
Identifiers: *Burlington Reservoir(NC), *Recreation capacity.

This is the second in a series of reports designed to develop methods, models and guidelines useful to lake managers as they seek to measure or predict capacity as a step toward optimiziang the recreational output of lake systems. This report applies systems concepts are applied to the problem of analyzing the capacity of water-based recreation systems. The conceptual framework of a simulation model and a number of explanatory models representing boating behavior are presented. (See also W74-07719), (Gordon A. Hammon, Harold K. Cordell, et al, 'Capacity of Water-Based Recreation Systems, Part I - The State of the Art,' April 1974.)
W74-12364

SOCIAL DIMENSIONS OF URBAN FLOOD CONTROL DECISIONS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
For primary bibliographic entry see Field 6F.
W74-12369

DETERMINATION ON NEVADA'S ATTITUDE TOWARD WATER RESOURCES RESEARCH,
Nevada Univ., Reno. Desert Research Inst.
R. M. Whitacre.
Completion Report, August 1974, 5 p. OWRT A-041-NEV(1). 14-31-0001-3228.

Descriptors: *Attitudes, *Information exchange, *Communication, *Research priorities, *Project planning, *Nevada.
Identifiers: Information dissemination, Research results, Advisory groups, Research planning.

One of the major problems confronting a research center is the dissemination of information to the people of the area as to how the research results can be of value to the community. The primary objective of this particular study was to identify needs and priorities of water resources research in Nevada, to recommend programs and guidelines to meet those needs and the ultimate dissemination of these findings by the Center for Water Resources Research, Reno, Nevada. It was found that a concerted effort must be made to determine the local research needs and the delivery of the research results. Also, that all information should be prepared both for technical use and use by the avefage citizen. Finally, a statewide group of interested organizations and officials should be formed to advise the Center as to the water resouce needs and problems in Nevada. (Fallon-Nevada)
W74-12371

MANAGEMENT FOR THE FUTURE,
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-12459

THE ECONOMICS OF ECOLOGY,
Colorado Univ., Boulder.
For primary bibliographic entry see Field 6G.
W74-12460

INCREMENTALISM AND ENVIRONMENTALISM,
Yale Univ., New Haven, Conn.
For primary bibliographic entry see Field 6G.
W74-12463

REGIONAL ENVIRONMENTAL MANAGEMENT AND THE DECISION MAKING PROCESS,
San Diego County, Integrated Regional Environmental Management Project, Calif.
For primary bibliographic entry see Field 6G.
W74-12466

A DESCRIPTION OF THE ENVIRONMENTAL PLANNING AND MANAGEMENT PROJECT,
Metropolitan Government of Nashville Davidson County, Tenn.
For primary bibliographic entry see Field 6G.
W74-12467

THE CONCEPT OF CARRYING CAPACITY,
Utah State Univ., Logan. Dept. of Civil and Environmental Engineering.
A. B. Bishop, R. Toth, A. B. Crawford, and H. H. Fullerton.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. V:24-V:37. 1974. 3 fig, 2 ref.

Descriptors: *Carrying capacity, *Environmental control, *Environmental effects, *Resources, *Resources development, Resource allocation, Costs, Economics, Social aspects, Regional development, Spatial distribution, Urbanization, Constraints, Limiting factors, Benefits, Costs.
Identifiers: Regional growth, Urban regions, Growth limitations.

Carrying capacity is the level of a certain activity that can be sustained in a given environment. Recent rapid rise of concern for environmental problems has revealed that levels of particular activities (e.g. automobile transportation, sewage disposal) in many urban areas have already exceeded carrying capacities with dire results. The concept of carrying capacity must be included in planning regional development. Determinants of carrying must be considered. First, resources of the environment should be cataloged: ambient resources (airsheds, watersheds, sunlight); spatial resources (underground, surface and air); infrastructure and distributive resources (utilities, transportation); ecological resources (plants, animals); sociocultural resources; economic resources (labor, capital, raw materials); and amenity resources (seashores, open space). The desired information about each resource should include the quality and quantity, renewability, spatial distribution, and economic and social costs. Linkages between the urban environment and the region, e.g. linkages of transportation and water and energy distribution, are the second determinant, and life styles and social values of the individuals and institutions, the third. Application of carrying capacity must consider both the stability and resiliency of the system as it moves toward the equilibrium state, the factor which limits resource use or growth, and the factor which might trigger an unplanned and undesired chain of events in the ecological or urban system. (See also W74-12457) (LaPointe-North Carolina)
W74-12469

FIXED VERSUS VARIABLE ENVIRONMENTAL STANDARDS,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 6G.
W74-12470

THE STRATEGIC ENVIRONMENTAL ASSESSMENT SYSTEM (SEAS): A RESEARCH PROJECT,
Environmental Protection Agency, Washington, D.C.
S. M. Greenfield.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. VI:26-VI:31. 1974.

Descriptors: *Assessments, *Computer models, *Cost-benefit analysis, Environmental effects, Decision making, Optimization, Pollution effects, Planning, Long term planning, Regional analysis, Research and development, Analytical techniques.
Identifiers: Strategic Environmental Assessment System(SEAS).

Predicting long range environmental effects of different societal options is one of the most important challenges facing the environmental field. Benefits from such forecasting include a systematic organization of the many criteria, social, economic, and environmental, that determine the effectiveness of different environmental strategies. Another benefit is the assistance that could be given to environmental managers in providing comprehensiveness, and following the progress of certain programs in achieving stated goals. Midcourse correction could be applied more easily by testing a set of alternative goal policies. The Strategic Environmental Assessment System model will have these important and new characteristics: (1) deal explicitly with pollution generators, possible controls, and known effects of residuals; (2) be a national level model system; (3) have a 10 to 20 year time horizon; (4) make use of official environmental, economic and demographic data; (5) be used together with expert opinion; and (6) project the state of the environment and socioeconomic systems. A text model of the system will be completed in December and will be used to prepare a '1980 State of the Environment' projection. Initially SEAS will be used to assess different policy options, integrating the computer's capabilities and human expert opinion, and to establish research goals. Ultimately it would aid in policy formulation and in following the progress of the Nation. (See also W74-12457) (LaPointe-North Carolina)
W74-12472

THE DEVELOPMENT AND OPERATION OF A PROTOTYPE STATE ENVIRONMENTAL INFORMATION CENTER,
East Central State College, Ada, Okla. Environmental Information and Media Center.
For primary bibliographic entry see Field 10D.
W74-12473

COMMUNICATIONS IN ENVIRONMENTAL MANAGEMENT,
Metropolitan Regional Council, Inc., New York.
R. T. Davis.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. VI:35-VI:39. 1974.

Descriptors: *Information exchange, *Environmental management, *Communication, *Regional development, *Decision making, Planning, Frequency, Transmission, Networks, Timing, Costs, Administrative agencies, Local governments.
Identifiers: *Television, Communication system, Microwave transmission, World Trade Center, New York City(NY).

Microwave television transmission offers the capability of more efficiently linking together decisionmakers of regional governments. In September, 1970, the Metropolitan Regional Council of New York City established a microwave type of closed circuit system using the World Trade

Center as a central point (a tall building or mountain being needed to establish an unobstructed path between points), connected with 17 points in the metropolitan area. The system, which allows live, two way, bi-directional discussion, is now almost completed and may be extended to branch offices, police stations and hospitals, and coordinated with a cable television system. Present strategy is to employ the system to allow decision-makers more real communication time to monitor specific progress and specific projects. However, local governments are reluctant to buy a system over which they exercise no control, a period of time is required for users to adapt themselves to bi-directional television, utility of such a system must be clearly demonstrated to local governments. A number of problems have arisen including a lack of understanding on how to best use the system, inadequate financing techniques, reluctance of designers to work with small, incrementally increasing systems instead of large systems, and the tendency of the hardware to sometimes impede the discussion. However, such systems will increase comprehensiveness and cohesion so that systematic decisions can be made. (See also W74-12457) (LaPointe-North Carolina)
W74-12474

MANAGING AT THE LOCAL LEVEL,
International City Management Association, Washington, D.C.
M. E. Keane.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. VII:40-VII:42. 1974.

Descriptors: *Local government, *Conferences, *Decision making, *Community development, *Environment, Communications, Pollution, Governmental interrelations, State governments, Information exchange, Political aspects, Standards, Planning, Comprehensive planning.
Identifiers: Conference summarization.

The need for strong local government in the environmental movement should be emphasized and discussed: (1) The environmental movement embraces a wide variety of individuals. Conferences are essential for communication. (2) The mass media must be educated to the issues and utilized more effectively than current crisis reporting. (3) Quality of life should be monitored at some base line level so as to include those who have been excluded from society's affluence. (4) We must realize that the politician will make the ultimate decisions, and must develop an understanding of political pressures which burden him. (5) Adaptation to the environment occurs at the local level. Effective community action depends upon a national foundation of basic law, commitment and resources. (6) Traditional programs should invite local initiatives. (7) Environmental managers must adapt themselves to the incremental nature and slower pace of local decisionmaking, due to the proximity of the citizenry to local officials. (8) Local level expertise must be developed to enable local political leaders to better understand and analyze environmental issues. (9) Technology needed by local governments differs from that used by universities and industry. More organizations must be created to furnish the needed technology. (10) Citizen involvement is vital. Strategies must be developed to efficiently incorporate the citizenry in decision-making. (See also W74-12457) (LaPointe-North Carolina)
W74-12478

THE COST OF GROUNDWATER VS. SURFACE WATER,
Moody and Associates, Meadville, Pa.
For primary bibliographic entry see Field 4B.
W74-12535

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

COMPUTER MANAGEMENT OF A COMBINED SEWER SYSTEM,
Municipality of Metropolitan Seattle, Wash.
For primary bibliographic entry see Field 5D.
W74-12003

PROCESS/FINANCIAL MODELS,
For primary bibliographic entry see Field 6A.
W74-12112

AN INVESTIGATION OF THE OPTIONAL ON-LINE CONTROL OF A WATER SUPPLY NETWORK,
Cambridge Univ. (England). Engineering Lab.
For primary bibliographic entry see Field 4A.
W74-12143

ECONOMIC EFFECTS OF SUBSIDIES FOR WASTE ABATEMENT,
Clemson Univ., S.C. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-12199

BRINE DISPOSAL TREATMENT PRACTICES RELATING TO THE OIL PRODUCTION INDUSTRY,
Oklahoma Univ. Research Inst., Norman. School of Civil Engineering and Environmental Science.
For primary bibliographic entry see Field 5D.
W74-12211

LAND SUBSIDENCE: AN ECONOMIC ANALYSIS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
C. McCauley, and R. Gum.
Available from the National Technical Information Service as PB-235 913 $3.00 in paper copy, $2.25 in microfiche. Completion Report, (1974), 10 p, 1 tab, 9 ref. OWRT A-030-ARIZ(2), 14-31-0001-3503.

Descriptors: *Land subsidence, *Groundwater, *Overdraft, *Arizona, Economics.
Identifiers: *Economic analysis.

Land subsidence due to groundwater overdraft has been assumed to be one of Arizona's major water related problems. The premise is investigated from an economic point of view. It is concluded that in the case of Arizona the physical fact of land subsidence has little or no economic significance.
W74-12225

SOME EVIDENCE OF ECONOMICS OF SCALE IN HAWAIIAN SUGAR PLANTATION,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 3F.
W74-12344

PRIMARY DATA ON ECONOMIC ACTIVITY AND WATER USE IN PROTOTYPE OIL SHALE DEVELOPMENT AREAS OF COLORADO: AN INITIAL INQUIRY,
Colorado State Univ., Fort Collins. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-12356

WATER PRICING DURING URBAN DEVELOPMENT,
Pennsylvania State Univ., University Park. Dept. of Agricultural Economics and Rural Sociology.
F. M. Goode.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 044, $3.75 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Research Publication Number 81, June 1964. 60 p, 5 tab, 7 append. OWRT B-033-PA(1). 14-31-0001-3326.

Descriptors: *Public utilities, *Marginal costs, Wells, Municipal water, Pricing, Water costs, *Water uses, Model studies, Interest, Bond issues, Investment.
Identifiers: *Urban development.

The objcetive was to determine if the water payments by the new users are sufficient to pay for the operation and maintenance costs as well as costs associated with developing a new well field. A model was developed to simulate future system growth. This model generated estimates of the amount of new users' payments available each year to pay for the construction of the new wells. Comparing these estimates to the principal and interest payments on the bond issue which financed the well construction gave an indication of whether or not new users paid for the new wells. Also, information was developed on the reated question of extent to which various types of new users pay for the new wells.
W74-12366

IMPACT OF POLLUTION ABATEMENT ON CAPITAL ALLOCATION AND PROFITABILITY,
Canadian Pulp and Paper Association, Montreal (Quebec).
For primary bibliographic entry see Field 5G.
W74-12426

THE COST OF GROUNDWATER VS. SURFACE WATER,
Moody and Associates, Meadville, Pa.
For primary bibliographic entry see Field 4B.
W74-12535

FACTORS AFFECTING DESIGN, DEVELOPMENT AND COST OF WELLS,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8B.
W74-12541

THE COST OF GEOPHYSICAL EXPLORATION.
For primary bibliographic entry see Field 8B.
W74-12544

6D. Water Demand

PROPOSED KIELDER WATER RESERVOIR SCHEME COMPUTER APPLICATION IN YIELD ASSESSMENT,
Northumbrian River Authority (England).
For primary bibliographic entry see Field 4A.
W74-12130

ESTIMATING RESERVOIR RECREATIONAL VISTS IN INDIANA,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W74-12196

LAND POTENTIALS: FORSYTH COUNTY PHYSIOGRAPHY.
City-County Planning Board, Winston-Salem, N.C.
City-County Planning Board, Winston-Salem, North Carolina, December 1968. 48 p, 12 fig, 7 tab, 43 ref, 4 append.

Descriptors: *Geomorphology, *Land classification, *Data collections, *Regional analysis, *North Carolina, Climatic data, Soil types, Soil surveys, Urbanization, Groundwater, Regional development, Comprehensive planning.
Identifiers: *Forsyth County(North Carolina), *Winston-Salem(North Carolina).

The physiography of Forsyth County, North Carolina, was studied as part of a larger study to be used for the development of a comprehensive plan for the area. Forsyth County is located in the Northwestern portion of North Carolina. It is a predominately rural county, but it is becoming urbanized. The population in 1968 was about 227,600 and the rural portion was estimated at 39,200. The altitude of Forsyth County ranges between 800 and 1,000 feet. The area is well drained, and lies on the Piedmont of the Blue Ridge Mountains and Great Smoky Mountains. Freezing temperatures occur for about 3 months, and temperatures exceed 89 degrees for about 1.5 months per year. Precipitation averages 44.5 inches annually, with a fairly constant amount received throughout the year. Soil types are generally favorable for urban development, although some limitations do exist. Where not suited for urban development, soils are suitable for use for recreational uses, forestry and agriculture. The geologic base of the area provides essential minerals, including sand, gravel, clay and ground water. Ground water quality is generally acceptable; contamination has thus far been only an isolated problem and hardness and iron content are only rarely troublesome. (Poertner)
W74-12241

CHATTANOOGA AREA REGIONAL COUNCIL OF GOVERNMENTS COMPREHENSIVE WATER AND SEWER STUDY: HAMILTON, WALKER AND CATOOSA COUNTIES, BOOK TWO.
Hensley-Schmidt, Inc., Chattanooga, Tenn.
For primary bibliographic entry see Field 6A.
W74-12242

6E. Water Law and Institutions

WATER QUALITY CONSIDERATION FOR THE METAL MINING INDUSTRY IN THE PACIFIC NORTHWEST,
Environmental Protection Agency, Seattle, Wash.
For primary bibliographic entry see Field 5G.
W74-12085

COMPUTER BASED MANAGEMENT SYSTEMS--OPPORTUNITIES IN THE NEW ORGANIZATION,
For primary bibliographic entry see Field 6A.
W74-12110

SOME EXTENSION SERVICE CAPABILITIES,
Georgia Univ., Athens. Cooperative Extension Service.
C. P. Ellington.
In: Proceedings of the Joint Conference on Recycling Municipal Sludges and Effluents on Land, July 9-13, 1973, Champaign, Illinois, The National Association of State Universities and Land-Grant Colleges, Washington, D.C., p 213-214, 1973.

Descriptors: *Research, *Education, *Information exchange, *Local governments, *Water resources, *Recycling, *Municipal wastes, Agriculture.
Identifiers: Community support, County leadership.

The Cooperative Extension Service, created by Congress in 1914, has the ongoing function of providing information from research of the Agricultural Experiment Stations. The present role of this service is to work through county leadership towards changes at local levels. Community support is necessary for any modification of water resources use. Recycling of municipal sludges is one specific area in which education and information should be disseminated to the public. (Prague-FIRL)
W74-12172

INFORMAL OPINIONS,
Food and Drug Administration, Washington, D.C.
C. Jelinek.
In: Proceedings of the Joint Conference on Recycling Municipal Sludges and Effluents on Land, July 9-13, 1973, Champaign, Illinois, The National Association of State Universities and Land-Grant Colleges, Washington, D.C., p 215-217, 1973.

Descriptors: *Food, *Fertilizers, *Toxicity, *Contamination, *Heavy metals, Pesticides, Crops, Mercury, Lead, Cadmium, Zinc, Organic chemicals measurement, Polychlorinated biphenyls.

The Bureau of Foods within the Food and Drug Administration asks that caution be used in the application of sludge or effluents as fertilizers. Levels of toxicity are very vague, including contamination by heavy metals such as mercury, lead, cadmium, arsenic, selenium, and zinc. Organic chemicals such as pesticides, PCB's, are also included. Recommended are monitoring operations for food crops and animal feed crops. For example, a test might be set up using both a control and a commercial fertilizer, measuring for pesticides, pathogenic organisms, and heavy metals. (Prague-FIRL)
W74-12173

FLOOD CONTROL, NAVIGATION, AND OTHER ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA,
Minnesota Univ., Minn. Dept. of Agricultural and Applied Economics.
For primary bibliographic entry see Field 6F.
W74-12206

WATER SUPPLY AND WATER POLLUTION CONTROL CAPITAL PROGRAM 1972-1985.
Delaware Valley Regional Planning Commission, Philadelphia, Pa.
(1972), 92 p, 14 fig, 15 tab. HUD Grant.

Descriptors: *Planning, *Water pollution control, *Water supply, *Delaware River Basin Commission, *Capital costs, *Regional analysis, *Delaware River, Budgeting, Financing, Water resources development, River basins, Valleys, Project planning, Delaware, Construction costs, Scheduling, Long-term planning.
Identifiers: *Capital program, Development program.

The Water Supply and Water Pollution Control Capital Program 1972-1985 is the official, Board approved, companion working document of the 1985 Regional Water Supply and Water Pollution Control Plan. This 1972 Capital Program constitutes a major development in Water Supply and Water Pollution Control Capital Programming in the Delaware Valley Region. For the first time, the long range development of water and sewer facilities has been scheduled for the region on an annual cost basis. This approach, therefore, establishes a significant change in format from that of the preliminary document produced in 1969. The program presents two major scheduling periods. The first is from 1972 to 1977, by individual year; the second aggregates the period 1978 to 1985. The program favorably reflects all decisions of the Delaware Valley Regional Planning Commission (DVRPC), since 1969. Projects which have been implemented to data have been deleted. Consequently, such changes represent almost a complete turnover of capital projects since 1969 for many counties. A comprehensive study was designed by the DVRPC staff which would provide for a uniform methodology of analysis and application to all projects in the region. In using this approach, scheduling allocations could then be best determined on the basis of regional and environmental needs rather than on political boundaries or influences. Under this method, political areas would not be measured against each other and long range projections would thus be made on the basis of watershed needs. (Poertner)
W74-12233

WEBER RIVER BASIN INCLUDING DAVIS COUNTY AND THE OGDEN S.M.S.A.: WATER QUALITY MANAGEMENT PLANNING, PHASE I--PROGRAM DESIGN.
Stevens, Thompson and Runyan, Inc., Portland, Oreg. and Nielsen, Maxwell and Wangsgard, Inc., Salt Lake City, Utah.
For primary bibliographic entry see Field 6A.
W74-12238

LEGAL PROBLEMS IN WATER POLLUTION CONTROL,
New York State Dept. of Environmental Conservation, Albany.
D. F. Metzler.
Preprint No 1891, American Society of Civil Engineers, National Water Resources Engineering Meeting, Washington, D.C. January 29-February 2, 1973. 15 p.

Descriptors: *Water pollution control, *Legal aspects, *New York, Administration, Legislation, Law enforcement, Equity, Permits, Penalties(Legal), Pollution abatement, Water quality, Water quality control.

New York State has an agressive and increasingly effective water pollution control program. This program has led to $3.1 billion of work completed or underway since 1966 and is expected to result in another $2.5 billion of work to be started in the next 5 years. The experiences gained in this program should be of assistance in the formulation of water pollution control programs by other states and the federal government. Three eras of water pollution control can be described: (1) the initial period, when control was practically non-existent; (2) a period of increased activity in which waters were surveyed and classified and cooperative approaches were used to abate pollution; and (3) the present intense program, highly dependent on legal action against pollutors. As a result of New York State programs, 6 general conclusions were reached: (1) water quality standards provide a sound basis for pollution abatement programs, maintained by limits on specific discharges, (2) water quality regulations should be a part of an overall environmental protection program; (3) enforcement should aim at a strengthening regional solutions; (4) water pollution laws should be expanded and interpreted by a board or commission formed from all parts of society; (5) a well-managed permit system is essential and needs to be supported by a monitoring system; and (6) nonpoint sources of pollution will require new methods of control, including land-use regulations. (Poertner)
W74-12239

TECHNICAL REPORT FROM THE STOCKHOLM UN CONFERENCE,
Swedish Water and Air Pollution Research Lab., Stockholm.
For primary bibliographic entry see Field 6G.
W74-12401

SURVEY OF ENVIRONMENTAL LEGISLATION IN THE GERMAN FEDERAL REPUBLIC (UEBERSICHT UEBER DIE UMWELTGESETZ-

GEBUNG IN DER BUNDESREPUBLIK DEUTSCHLAND),
Technische Universitaet, Darmstadt (West Germany). Wassert und Abwasserforschungsstelle.
W. Brecht.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 59-62, 1973.

Descriptors: Europe, *Legislation, *Pollution abatement, *Environmental control, *Pulp and paper industry, Water consumption(Except consumptive use), *Waste water(Pollution), Economics, *Financing, Research and development, Project planning, Potable water, Legal aspects, Regulation, Industrial water, Biological treatment.
Identifiers: *West Germany(German Federal Republic).

Water demands in West Germany presently total about 16 billion cu m per year, of which about 72% is industrial and 14% each is trade and domestic usage. The pulp and paper industry stands in 4th place among all 45 industrial water users, with an annual demand of 930,000,000 cu m in 1969. West German legislative measures provide for both short- and long-term environmental protection, such as extensions of the Water Conservation Law in force since March 1, 1960, notably enforcement and pollution penalty provisions enacted Feb. 28, 1973. A 1985 deadline requires biological clarifier installations for 85% of the total pollution. Potable water demand is expected to double by the year 2000, requiring considerable local, regional, and federal financing to treat about 50% of all industrial effluents which are still being discharged into receiving waters. The seriousness with which these problems are being approached is evident from various research and project programs mentioned. (See also W74-12400) (Brown-IPC)
W74-12402

FRENCH LEGISLATION AND POLICIES REGARDING ENVIRONMENTAL PROTECTION (LEGISLATION ET POLITIQUE FRANCAISES EN MATIERE DE PROTECTION DE L'ENVIRONNEMENT),
Societe Aussedat-Rey, Saillat (France).
J. Charbonnieras.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 63-71, 1973. 7 maps.

Descriptors: *Legislation, Europe, *Environmental control, *Pollution abatement, *Water pollution control, Legal aspects, Pulp and paper industry, Governments, Regulation, River basin commissions, Regional development, Planning, Projections, Project planning.
Identifiers: *France.

The historical development of French legislative measures against water and air pollution is traced from its beginnings in 1810 to the most recent decree of March 27, 1973. Emphasis in the French approach to ecology problems is on regional authorities in charge of managing various natural river basins. Several time-planned stages in antipollution measures have met with encouraging results. Thus, the 5th 5-year plan (1964-1969) achieved a 10% overall reduction in territorial pollution. The 6th plan (1971-1975) aims at a 20% reduction. (See also W74-12400) (Brown-IPC)
W74-12403

LEGISLATION ON ENVIRONMENTAL PROTECTION IN SCANDINAVIA,
National Water Board of Finland, Helsinki.
S. Jaatinen.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 73-86, 1973.

Descriptors: *Legislation, *Governments, Europe, *Pollution abatement, *Water pollution control, *Environmental control, Planning, Legal aspects, Regulation, Cooperatives, Coordination, Organizations, Administrative agencies, Pulp and paper industry.
Identifiers: *Norway, *Sweden, *Denmark, *Finland.

Environmental protection laws and regulatory pollution-control agencies in Denmark, Finland, Norway, and Sweden are reviewed, including cooperative efforts among all Scandinavian countries through the Nordic Council. (See also W74-12400) (Brown-IPC)
W74-12404

CANADA'S APPROACH TO ENVIRONMENTAL POLLUTION CONTROL FOR THE PULP AND PAPER INDUSTRY,
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W74-12405

MECHANICAL TREATMENT OF PULP AND PAPER MILL EFFLUENT,
Nevalainen and Orivuori, Helsinki (Finland).
For primary bibliographic entry see Field 5D.
W74-12418

FINAL CONFERENCE REPORT FOR THE NATIONAL CONFERENCE ON MANAGING THE ENVIRONMENT.
For primary bibliographic entry see Field 6G.
W74-12457

PLANNING FOR QUALITY GROWTH,
Hawaii State Dept. of Planning and Economic Development, Honolulu.
For primary bibliographic entry see Field 6G.
W74-12461

ENVIRONMENTAL DECISION MAKING,
For primary bibliographic entry see Field 6G.
W74-12462

THE POSITIVE ROLE OF ENVIRONMENTAL MANAGEMENT,
Indiana Univ., Bloomington. Dept. of Political Science; and Indiana Univ., Bloomington. Dept. of Public and Environmental Affairs.
For primary bibliographic entry see Field 6G.
W74-12464

STATE GOVERNMENTS TACKLE POLLUTION,
Woodrow Wilson International Center for Scholars, Washington, D.C.
For primary bibliographic entry see Field 6G.
W74-12465

IMPLEMENTATION OF CITIZEN PARTICIPATION IN THE MUNICIPAL PROCESS,
Environmental Protection Agency, Washington, D.C. Technical Assistance Research Programs.
For primary bibliographic entry see Field 6G.
W74-12468

ENFORCING ENVIRONMENTAL LAW IN THE CITY,
New York City Corporation Counsel.
N. Redlich.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. V:59-V:61. 1974.

Descriptors: *Law enforcement, *Legal aspects, *Legal review, *Regulation, *Environmental control, Local governments, Pollution abatement, Standards, Permits, Administrative agencies, Urbanization, *New York.
Identifiers: Enforcement, Environmental law, *New York City(NY).

For environmental laws to be efficiently enforced in an urban setting there must be a restructuring of city agencies and traditional enforcement techniques must give way to new more easily administered methods. In New York the many departments which addressed environmental problem areas, for example the Sanitation Dept., the Dept. of Water Resources, etc., have merged into the Environmental Protection Administration, which has the ability to weigh the total effect of a particular decision. Representatives from this agency also sit on interdepartmental commissions, and can bring to these commissions a broad scale and expertise in many subcategories of environmental knowledge. Traditional enforcement techniques are totally unsuitable for an urban setting. Imposition of standards on the polluting devices (incinerators, noise generators, and fuel burning equipment) have been more effective for the City of New York. Permits to operate such devices are now required, providing greater control by the enforcing agency which also has the power to test devices to determine if they meet proper standards. A nine man environmental control board has been created to remove pollution test cases from already overcrowded court calendars. This board has the power of review, may issue cease and desist orders, permit relocation, and impose civil penalties of up to $100/day. However these fines must still be enforced in court. Citizen enforcement has also been developed. If no action is forthcoming from the agency, after a complaint is filled, the citizen may take the complaint to court and receive a share of any fines the court might order the offender to remit. (See also W74-12457) (LaPointe-North Carolina)
W74-12471

STATE RESPONSIBILITY IN MANAGING THE ENVIRONMENT,
Connecticut Dept. of Environmental Protection, Hartford.
D. W. Lufkin.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. VII:10-VII:12. 1974.

Descriptors: *State governments, *Environmental management, *Connecticut, Standards, Solid waste, Electric power production, Fuels, Electric power cost, Wildlife habitats, Legal aspects, Legislation, Economic feasibility.
Identifiers: Department of Environmental Protection(Conn).

The philosophy of the new federalism is to leave to the states the enforcement at the regional level of environmental standards set by the federal government. The federal government should set objectives, support state governments both technically and financially, and enforce only when the state government is not carrying out its responsibilities. In Connecticut the Department of Environmental Protection was established under Act 872 by uniting under one department those environmental responsibilities previously scattered among many state agencies, among them air, water, pesticides, radiation and all state natural resources for recreation. With the General Electric Company a solid waste program was established setting up 23 watersheds, separation and reuse of noncombustible materials, and disposal of combustible materials, all at a cost of $10 per ton. A solid waste authority was created with a bonding capability of $250 million. The main difficulty is the lack of administrative enforcement options, now limited to drawn out court proceedings. A recent registration program for the 16,000 point sources of air pollu-

tion resulted in 25% noncompliance, and it is infeasible to bring the 4000 non-compliers to court. However, legislation will soon be passed which gives administrators a fining capability. Fines will be levied by estimating the difference between costs of non-compliance (legal fees, operating costs saved, capital use saved) with that of compliance (equipment costs, opportunity costs, operation costs), and will be discounted over time. Such a running fine should be an incentive for compliance and should eliminate all but the most meritorious suits. (See also W74-12457) (LaPointe-North Carolina)
W74-12475

HOW A REGIONAL ORGANIZATION ASSUMES ENVIRONMENTAL RESPONSIBILITY,
Metropolitan Council of the Twin Cities Area, Minn.
F. T. Lamm.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. VII:13-VII:18. 1974.

Descriptors: *Regional development, *Environmental management, *Local government, Political aspects, Air pollution, Solid waste, Water pollution, Recreation, Budgeting, Land use, Legislation, Planning, Federal Water Pollution Control Act.
Identifiers: Twin Cities Area Metropolitan Council.

Many issues of environmental impact must be handled on the regional level. However due to the relative newness of regional government, regional organizations must take bold affirmative steps in assuming their responsibilities and establishing their authorities. Designation by HUD as the area-wide planning organization with appropriate certifications and as a regional clearinghouse under Bureau of the Budget Circular A-95 are important indications of environmental responsibility. Some methods for assuming environmental reaponsibilities for air quality, solid waste management, water resources, water pollution, recreation and protection of open spaces as handled by the Twin Cities Area Metropolitan Council are discussed briefly. The state is primarily responsible for air quality. The Minnesota Pollution Control Agency is able to delegate many powers to regional implementation organizations for cooperative development of a state-wide implementation plan for air quality. The Metropolitan Council has developed a coordinated program with the state for solid waste management. Funding is available from EPA for regional water resource planning, and further funds should become available under sections of the Federal Water Pollution Control Act. Water resource planning offers an excellent opportunity for regional agencies to provide an important service for local governments. In the Twin Cities area, the different watershed districts are submitting their Overall Plans to the Metropolitan Council for review and approval. Local governments are reluctant to consider open space protection in zoning and land use policies. Efforts have been confined to persuasion and the creation of an Open Space Advisory Board. (See also W74-12457) (LaPointe-North Carolina)
W74-12476

THE COOPERATIVE APPROACH TO ENVIRONMENTAL ENHANCEMENT,
State Univ. of New York, Albany.
For primary bibliographic entry see Field 6G.
W74-12477

OIL, GAS, AND WATER LAW--TODAY AND TOMORROW,
Gee and Hearon, Austin, Tex.
J. C. Dougherty.
In: Oil and Water--A Symposium, Bureau of Economic Geology, Texas University, Austin, January 29, 1965. p 56-64, (1965). 19 ref.

Descriptors: *Legal aspects, Laws, Statutes, Ordinances, *Groundwater, Recycling, Judicial decisions, Water law, Economics, Legislation, Project planning, Public health.
Identifiers: Pooling, Slant holes, *Legal tomorrows, Railroad commission, Supreme Court, Texas water commission, Pollution control board, Federal Water Resources Act of 1964.

The concept is discussed of 'legal tomorrows'--or steps that may be taken soon in oil, gas, and water law by courts, administrative agencies, and legislative bodies. The first 'legal tomorrow' is compulsory pooling of interests in order to give each land tract owner his fair share of recoverable production, while at the same time efficiently managing production from a reservoir. The legislative history of pooling is outlined and a proposed pooling bill is listed. The second 'legal tomorrow' concerns jurisdiction over salt water disposal; recent legislation and court cases are cited. The third 'legal tomorrow' is in the developing guidelines for Commission regulation of the slant hole problem where directional surveys disclose greater than permissible vertical deviation. The Supreme Court has denied to the Railroad Commission power to devise and assess penalties of its own making not specifically authorized by statute. An effort to coordinate the work of the Texas Water Commission, the Texas Water Development Board, and the Texas Water Pollution Control Board and to integrate them into a long-range State Water Plan is described. (Campbell-NWWA)
W74-12547

OIL AND GAS VERSUS WATER IN THE SOUTHWEST: CONFLICT OR COMPROMISE,
Humble Oil and Refining Co., Corpus Christi, Tex.
R. E. Faggioli.
In: Oil and Water--A Symposium, Bureau of Economic Geology, Texas University, Austin, January 29, 1965. p 7-20 (1965).

Descriptors: *Legal aspects, *Groundwater, Conservation, Laws, Ordinances, Statutes, Economics, Public health, Industries, Potable water, Aquifers, Saline water, *Oil industry, *Southwest US, *Texas.

The transition from a pre-1930 agrarian economy in Texas to current water needs for irrigation, municipal, and industrial purposes has been accompanied by legislative action directed toward conservation of this important natural resource. Numerous federal and state agencies are interested in Texas water, but the four principal organizations for state-wide water jurisdiction are: Texas Water Commission, Texas Railroad Commission, Water Pollution Control Board, and Texas Water Development Board. The competition for subsurface water use resolves itself into two principal problem areas: depletion of ground water and pollution of ground water. The major part of the salt water produced in Texas was being injected as far back as 1961. Continued progress, including additional secondary recovery projects, has been accomplished since that time. Additional background in the geology of ground water should be considered on an academic level and in industry application. Prepared with a factual background a geologist can make himself aggressively available to industry organizations which work closely with governmental agencies having responsibilities related to water resources. As a result, the geologist should be in a position to give aid toward leading the conflict in water demands through compromise to compatibility. (Campbell-NWWA)
W74-12549

MOHAWK UTILITIES, INC. V. PUBLIC UTILITIES COMM. (APPEAL FROM PUBLIC UTILITIES COMMISSION ORDER).
307 N.E.2d 261 (Ohio 1974).

Descriptors: *Ohio, *Judicial decisions, *Public utility districts, *Water contracts, *Water allocation(Policy), Water distribution(Applied), Regulation, Legal review, Water law, Jurisdiction, Water policy, Water rights, State governments, Public utilities, Legal aspects, Contracts, Land tenure, Water districts.
Identifiers: Water rights(Non-riparian).

Plaintiff utility company appealed in order of the defendant regulatory commission directing the plaintiff to cease collecting water-availability charges. The sale contracts and warranty deeds for all lots sold in the Lake Mohawk subdivision contained provisions for water-use and water-availability charges. Each lot was assessed a fixed water-availability charge until the owner hooked up to the water system, at which time the charge became a fixed water-use charge in the same amount. Owners who had more than one lot were assessed the charge on each lot owned. On complaint of land owners the defendant ruled that the charge was unreasonable and unlawful and ordered it discontinued. This action followed. The Ohio Supreme Court upheld the plaintiff's contention that the commission's ruling was based on an erroneous interpretation of an earlier Ohio Supreme Court decision, but denied plaintiff's contention that the commission had no jurisdiction over the plaintiff's rates. Reversing the order of the commission, the court ruled that a restrictive covenant in a contract for sale of land assessing a water-availability charge is not per se contrary to law. (Deckert-Florida)
W74-12602

CONTROLLING ACTIVITIES OF COASTAL WETLANDS.
N.C. Gen. Stat., sec. 113-230 (1971).

Descriptors: *Wetlands, *North Carolina, *Shore protection, *Coastlines, *Coastal engineering, Coasts, Structures, Regulation, Decision-making, Legislation, State governments, Legal aspects, Wildlife conservation, Administrative agencies, Aesthetics, Public health, Safety, Commercial fishing, Coastal marshes, Eminent domain, Penalties(Legal), Marshes.
Identifiers: *Administrative regulations, *Coastal waters.

The Director of the North Carolina Department of Conservation and Development, in order to promote the public safety and health, and to protect wildlife and marine fisheries, is permitted to promulgate regulations concerning the altering of coastal wetlands. Before adopting or repealing any regulation there must be a public hearing in the county where the coastal wetlands are located. Notice must be given to any owner or claimed owner of such wetlands as well as to interest state agencies. Any order will be recorded with the register of deeds in the county where the land is located. A violation of any regulation will constitute a misdemeanor. Any person possessing an affected interest in the land may petition the superior court to determine whether the order so restricts the use of his property as to constitute a taking without compensation. If such a taking is found to have occurred, the order will be of no force, and the state will then be required to institute eminent domain proceedings. (Sperling-Florida)
W74-12603

WATER POLLUTION POLICY.
N.Y. Environmental Conservation Law, secs. 17-0101 thru 17-0105 (1972).

Descriptors: *Water pollution, *Water quality, *Water pollution control, *Water policy, *Water pollution treatment, New York, Legislation, Administration, Water conservation, Environmental sanitation, Waste disposal, Water pollution sources, Waste water treatment, Water supply, Water law, Water quality standards, Public health.

Water pollution control and its effects on fish, wildlife, industrial use and public health and enjoyment are considered. The purpose is to prevent any new pollution and abating existing pollution, thereby safeguarding the waters of the state of New York, under a program consistent with the declaration of policy. Definitions are set forth to be used in reference to the titles of the statute. Definitions are included for the terms persons, waters, marine district, sewage, standards, sewer systems, treatment works, outlets and shellfish. (Sutton-Florida)
W74-12604

DEPOSITING TRASH, GARBAGE, ETC., ON LANDS OF ANOTHER OR IN WATERS OF THE STATE.
N.C. Gen. Stat., secs. 14-134.1 (1965).

Descriptors: *North Carolina, *Water pollution sources, *Legislation, *Garbage dumps, Sanitary engineering, Regulation, State governments, Legal aspects, Municipal government, Water conservation, Watershed protection, Land management, Permits, Landfills, Administration.

It is unlawful for any person, firm or municipal organization to place or leave any trash or waste materials upon the lands of another without the written consent of the owner. Whether the materials are deposited there permanently or temporarily is immaterial. It is also unlawful, unless specifically authorized by law, to place or deposit, temporarily or permanently, any such waste materials in any waters within the state of North Carolina, including any waters over which the state has jurisdiction. It shall not be unlawful to deposit such waste materials in a public dump maintained by a municipality or county. A violation of this statute is a misdemeanor punishable by a fine of not more than $500.00 or imprisonment of not more than six months. (Sperling-Florida)
W74-12605

WATER AND WATER SUPPLY POLLUTION.
N.J. Stat. Ann., ch. 26:3B-4 (Supp. 1973), as amended, ch. 32, sec. 1 (1973) Laws of New Jersey.

Descriptors: *New Jersey, *Legislation, *Public health, *Waste water(Pollution), *Water pollution control, Water pollution sources, State governments, Regulation, Safety, Water supply, Water conservation, Industrial wastes, Municipal wastes, Sewage effluents, Discharge(Water), Waste water disposal, Farm wastes, Bodies of water, Wildlife conservation, Aesthetics, Social aspects, Water quality, Water pollution treatment.
Identifiers: Hazardous substances(Pollution).

Any person, corporation, or municipality is prohibited from depositing, accumulating, or providing storage facilities for certain delineated substances. Such substances include: human excrement; decomposable animal or vegetable matter; domestic, factory, workshop, mill or slaughterhouse refuse; and sink, laundry, milk, creamery, or cheese house waste. These and any other polluting matter are prohibited if dealt with as to gain access to any well, spring, stream, or any body of water, including oceans and estuaries. The prohibition applies only if the disposal causes or threatens injury to any person in health, comfort or property, or if the pollution causes or threatens degradation of water quality resulting in damage to the aquatic community or wildlife in and adjacent to the affected water body. (Sperling-Florida)
W74-12606

LOWRY V. NORRIS LAKE SHORES DEVELOPMENT CORP. (ACTION BY LANDOWNERS TO ENJOIN DEVELOPMENT CORPORATION FROM REQUIRING PURCHASE OF METERS AS CONDITION TO CONTINUING WATER SERVICE).
203 S.E.2d 169 (Ga. 1974).

Descriptors: *Georgia, *Judicial decisions, *Water contracts, *Legal aspects, *Water law, Land tenure, Water rights, Equity, Water distribution(Applied), Domestic water, Water conservation, Water allocation(Policy), Water policy, Water management(Applied), Water supply, Water supply development.
Identifiers: *Estopple, *Evidence, *Injunctive relief, *Water rights(Non-riparian).

Plaintiff lot owners brought suit against the defendant development company to enjoin defendant from requiring plaintiffs to purchase water meters as a condition to continued water service. The defendant had been furnishing water at a fixed rate, but wished to install water meters, charge a fee for the meters, and charge for water use. The plaintiffs argued that the defendant was contractually obligated under the plaintiffs' deeds to furnish water at a fixed rate of $10 per quarter. They also argued that statements made by salesmen at the time plaintiffs purchased their lots, equitably estopped the defendant from refusing to sell water to the plaintiffs at $10 per quarter. The trail court granted summary judgment for the defendant and plaintiffs appealed. The Supreme Court of Georgia affirmed, ruling that there was nothing contained in the deed which obligated the defendant to furnish water, and mere evidence that the defendant instructed its salesmen to sell prospective buyers that water would be provided for a given flat fee, did not create an equitable estoppel or contractual obligation to furnish water at the initial rate. (Deckert-Florida)
W74-12607

POTOMAC VALLEY CONSERVANCY DISTRICT.
Committee on Public Works, (U.S. House).
H.R. Rep. No. 1405, 91st Cong, 2nd Sess (1970). 18 p.

Descriptors: *Interstate compact, *River basin commissions, *Legislation, *Federal government, *Water pollution control, State governments, Budget, Administration, Government finance, Coordination, Natural resources, Conservation, Land resources, Delaware, Water resources development, Water resources, Water law, Economic aspects, Public health, Water treatment, Administrative agencies.
Identifiers: Congressional hearings.

A report is presented on congressional hearings on amendments to the compact creating the Potomac Valley Conservancy District and establishing the Interstate Commission on the Potomac River Basin. The purpose of the legislation is to broaden the authority of the Commission to include management of water resources and associated land resources. Its present authority is restricted to water pollution abatement. The Commission is to provide a liason between public and non-public agencies in the formulation and coordination of plans and programs for the protection and development of water and land resources. A provision in the original compact was deleted which limited the total contributions of the signatories to less than $30,000 annually. A proposed federal interstate compact, which is modeled after the existing Delaware River Basin Compact is presently under review. In view of increasing costs the Commission will have to retrench its presently restricted activities unless there is prompt action to remove the ceiling upon contributions. (Sperling-Florida)
W74-12608

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE NARROWS UNIT, MISSOURI RIVER BASIN PROJECT, COLORADO, AND FOR OTHER PURPOSES.
Committee on Interior and Insular Affairs (U.S. House).
H.R. Rep. No. 1132, 91st Cong, 2nd Sess (1970). 13 p.

Descriptors: *Cost-benefit analysis, *Legislation, *Flood protection, *Irrigation, *Multiple purpose project, Administration, Federal government, Administrative agencies, Government finance, *Colorado, Project planning, River basin, Water resources development, Water requirements, Water allocation(Policy), Groundwater resources, Recreation, Wildlife conservation, Hydroelectric powerplants, Aquifers, Confined water, Boating, Economic aspects, Fishing.
Identifiers: Congressional hearings.

A report is presented on a bill, favoring recommendation, to authorize the Secretary of the Interior to construct, operate, and maintain the Narrows unit in the Missouri River Basin project in Colorado. The Narrows unit was included in the general comprehensive plan of the Missouri River Basin project authorized by the Flood Control Act of 1944. The Narrows unit is a multiple purpose project that will provide maximum feasible utilization of the surface water resources of the area. It will provide supplemental irrigation supplies to 166,370 acres of presently irrigated land. It will also protect the South Platte River Basin from floods originating upstream. Outdoor recreational opportunities will be significantly increased. More wildlife habitat will be created in the plains region and hydroelectric power will be produced. Groundwater use in the past has depleted the aquifer supplies. At present surface flows and aquifers are not sufficient for efficient irrigation. The estimated cost of the unit as of 1969 was $68,050,000. (Sperling-Florida)
W74-12609

WATER BANK ACT--REPORT.
Committee on Agriculture and Forestry (U.S. Senate).
Sen. Rep. No. 1393, 91st Cong, 2nd Sess (1970). 8 p.

Descriptors: *Administrative agencies, *Supervisory control(Power), *Waterfowl, *Nests, *Migratory birds, Wetlands, Conservation, Agriculture, Water conservation, Water resouces, Reclamation law, Water rights, Projects, Water law, Decision making, Environmental effects, Costs, Natural resources, Marshes, Water resources development, Water management(Applied), Adoption of practices, Administration, Water policy, Ponds, Lakes.
Identifiers: *Coastal zone management.

The Secretary of Agriculture is authorized to enter into 10 year renewable contracts with landowners and operators of migratory waterfowl nesting and breeding areas for the conservation of water on specified wetlands. During the period of the contract, the landowners agree not to drain, burn, till, or otherwise destroy the wetland areas and not to use such areas for agricultural purposes, as determined by the Secretary. In return for the agreement, the Secretary of Agriculture makes payments to the owner or operator. The rate of annual payments is determined by the Secretary and may be increased if the owner or operator agrees to permit, without other compensation, access by the general public for hunting, trapping, fishing, and hiking. The bill also authorizes the Secretary to share the cost of establishing and maintaining conservation and development practices on the wetlands and adjacent areas. The bill requires the Secretary to carry out its provisions in harmony with wetlands programs administered by the Secretary of the Interior and to utilize the technical and related services of appropriate state, federal, and private conservation agencies to insure proper coordination. (Kelly-Florida)
W74-12610

OCEAN DUMPING CONVENTION IMPLEMENTATION.
Committee on Merchant Marine and Fisheries (U.S. House).
H.R. Rep. No. 568, 93rd Cong, 1st Sess (1973). 17 p.

Descriptors: *International commissions, *Legislation, *Waste disposal, *Navigation, *Water pollution control, Water pollution, Oceans, Federal jurisdiction, Federal government, International law, International waters, Foreign waters, Domestic waters, Administrative agencies, Ships, Adoption of practices, Navigable waters, Oil, Water law, Water policy, Legal aspects.
Identifiers: Coastal waters, Congressional hearings.

The Committee on Merchant Marine and Fisheries of the U.S. House of Representatives amended the Marine, Protection, Research and Sanctuaries Act of 1972. The amendment implemented those features of the recent Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter not presently included in the statute. The Act regulates the dumping of materials into ocean waters within U.S. jurisdiction. The Convention made a similar international agreement to regulate dumping of waste materials. The committee received the Administration's proposed amendment in February 1973, received testimony from witnesses representing several government departments supporting enactment of the amended bill, and approved it in September 1973. The amendment expands the coverage of the bill in regulating U.S. vessels and aircraft, materials which may be dumped, and federal agency activities already controlled under the Act. (Dillingham-Florida)
W74-12611

AUTHORIZING AND PROVIDING FOR CONSTRUCTION OF A WATER DISTRIBUTION SYSTEM AND A WATER SUPPLY FOR THE SOBOBA INDIAN RESERVATION.
Committee on Interior and Insular Affairs (U.S. House).
H.R. Rep. No. 1017, 91st Cong, 2nd Sess (1970). 18 p.

Descriptors: *California, *Administration, *Legal aspects, *Water supply, *Federal reservations, Water, Resources development, Water requirements, Water allocation(Policy), Water distribution(Applied), Land ownership, Irrigation, Domestic use, Federal government, Administrative agencies, Decision-making, Construction, Economic aspects, Political aspects, Water distribution, Farm use, Water law, Water conveyance, Conduits, Water works, Release.
Identifiers: Soboba Indian reservation(Calif).

The Secretary of the Interior is authorized to approve an agreement entered into by the Soboba Band of Mission Indians. The agreement releases an Indian claim against the Metropolitan Water District of Southern California and the Eastern Municipal Water District. In return the agreement provides for the construction of a water distribution system and a water supply for the Soboba Indian Reservation. Payment of $30,000 will be made by Metropolitan to the Secretary of the Interior for the benefit of the Indians. This payment will be made only after the lands that comprise the Soboba Indian Reservation are annexed to Metropolitan. All released claims issued from the construction of a tunnel through the San Jacinto mountains. The release will become effective upon the completion of the concurrent annexation of the reservation lands and the execution of the water service agreement. There shall be a joint determination of additional water supply and distribution facilities in order to provide domestic and irrigation water to the reservation Indians. (Sperling-Florida)
W74-12612

JURISDICTIONAL PROBLEMS IN CANADA'S OFFSHORE,
British Columbia Univ., Vancouver.
K. Beauchamp, M. Crommelin, and A. R. Thompson.
Alberta Law Review, Vol 11, No 3, p 431-469, 1973. 6 fig, 145 ref.

Descriptors: *Jurisdiction, *Canada, *Operations, *Continental shelf, *Natural resources, Resources development, Offshore platforms, Oil, Oil industry, Mineralogy, Exploration, Exploitation, Judicial decisions, Foreign countries, Constitutional law, International law, Legal aspects, Oceans, Continental slope, International waters, Water law, Water policy.

Canada's submerged continental margin includes both the continental shelf and the continental slope. Their combined area is estimated to cover almost two million square miles. As oil and gas exploration activities concentrate in offshore regions, it is inevitable that problems such as the extent of international boundaries and federal-provincial control over offshore resources will be encountered. The historical origin of offshore rights, current international law on the subject and various methods of determining boundaries are analyzed. The federal-provincial issue is discussed with emphasis on constitutional aspects, resource sharing and administration of the offshore operation. Included is a comparative study between Canada, Australia and the United States with respect to the control, development and exploitation of offshore resources. Finally, the applicability of anchillary federal and provincial laws to the offshore region is examined. (Ritchie-Florida)
W74-12613

YUMA IRRIGATION PROJECT--NOTICE OF OPERATION AND MAINTENANCE CHARGES.
For primary bibliographic entry see Field 3F.
W74-12614

HIGH SEAS OIL PORT ACT.
H.R. Rep. No. 692, Comm. on Merchant Marine and Fisheries, 93d Cong, 1st Sess, 1974. 43 p.

Descriptors: *Water pollution control, *Legislation, *Federal government, *Oil pollution, *Continental shelf, Regulation, Water law, Oceans, Governmental interrelations, Interagency cooperation, Pollution taxes(Charges), Water quality control, Law enforcement, Water pollution sources, Water quality, Sea water, Foreign trade, Adoption of practices, Environmental effects.
Identifiers: *Licenses, *Absolute liability, *Coastal waters, *Coastal zone management, *National Environmental Policy Act, Congressional hearings, Administrative regulations.

The Committee reports favorable on the High Seas Oil Port Act as amended. The bill will amend the Merchant Marine Act of 1936, and will authorize the Secretary of Commerce to issue permits for construction and operation of certain offshore port and terminal facilities. The Act is designed to minimize adverse impacts on the marine environment which result from construction and operation of high seas oil ports; the ports are means for receiving petroleum products transshipped to the United States. The report represents the consensus of the Merchant Marine and Fisheries Committee and the Committee on Interior and Insular Affairs, which was considering similar legislation. The Secretary of the Interior would establish rules and regulations for protection of the marine environment. The Coast Guard would be charged with enforcement of the Act. Civil and criminal penalties are provided. A High Seas Oil Port Liability Fund would be created by collecting a per barrel fee from the owners of any oil off-loaded at an offshore facility. The fund would be absolutely liable for any damages resulting from operations of the facilities. (Deckert-Florida)
W74-12615

A PLAN FOR MICHIGAN'S SHORELANDS.
Michigan Dept. of Natural Resources, Lansing.
August, 1973. 135 p, 29 fig, 17 tab, 87 photo, 4 append.

Descriptors: *Michigan, *Great Lakes, *Zoning, *Shores, *Water resources development, Public benefits, Land management, Administrative decisions, Social aspects, Lakes, Rivers, Planning, Long-range planning, Natural resources, Public lands, Environment, Environmental effects, Land development, Wetlands, Comprehensive planning.

Michigan's Great Lakes' natural shorelands are disappearing as dunes and trees are being replaced by residential homes, motels, campgrounds, marinas, power plants and other signs of civilization. While in the past there has been little or no shoreland planning, in the future a new management approach must be adopted or the natural beauty and uniqueness of the shorelands will be destroyed and lost forever. Since a no-development policy is unrealistic, controlled development is the basis of the Michigan plan. The basic principles underlying the plan are that any new developments in the shorelands should be limited to those activities and facilities which specifically require a shoreland location, that permissible developments should be planned, designed, constructed and operated so as to harmonize with the capacities and tolerance limits of the natural shoreland ecosystem. Public policy should foster and facilitate, to the maximum extent possible, the acquisition of significant shoreland environmental areas. (Barnes-Florida)
W74-12616

SURVEY OF ENVIRONMENTAL LEGISLATION,
For primary bibliographic entry see Field 6G.
W74-12618

DEEPWATER PORTS.
Hearings--Subcomm on Water Resources and Subcomm on Energy, Comm on Public Works, U.S. House of Representatives, 93rd Cong, 1st Sess, October 9, 10, 11, 1973. 379 p, 21 fig, 4 tab.

Descriptors: *Rivers and Harbors Act, *Legislation, *Deep water, *Engineering structures, *Harbors, Coasts, Port authorities, Transportation, Navigation, Offshore platforms, Permits, Regulation, State governments, Federal government, Oil reservoirs, Oil, International waters, Oil spills, Water pollution, Environmental effects, Engineering, Fuels, Water pollution sources, Ships, Adoption of practices.
Identifiers: *Coastal waters, *Oil Pollution Act, *Administrative regulations, *Congressional hearings, *Licenses.

This bill is an amendment to the Rivers and Harbors Act of 1965. It would establish a Federal licensing program for the regulation of construction and operation of port facilities behond three nautical miles from the coast of the United States. Such facilities are used principally for unloading crude oil and petroleum products between deep-draft vessels and the United States. Federal issuance of a license and its retention by the applicant would be dependent upon the applicant's satisfactory demonstration that the operation of the proposed facility will continue to meet requirements for protection of the public against adverse significant effects in the environment, international navigation, and land use along adjacent coasts. The hearings on this bill considered the alleged economc and environmental advantages accruing from deepwater ports, the possibility of their increasing the supply of fuel in the U.S., the testimony of expert witnesses regarding criticisms and commendations of specific points of the bill, as well as the depositions and testimonies of states and companies interested in deepwater port construction. (Dillingham-Florida)
W74-12619

CORPS OF ENGINEERS DREDGE AND FILL JURISDICTION: BUTTRESSING A CITADEL UNDER SIEGE,
For primary bibliographic entry see Field 5G.
W74-12620

OIL SPILLS: HOW SERIOUS A PROBLEM.
For primary bibliographic entry see Field 5B.
W74-12621

WATERSHED PROJECTS.
For primary bibliographic entry see Field 4D.
W74-12622

ENVIRONMENTAL DEFENSE FUND V. FROEHLKE (REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENTS).
473 F, 2d 346 (8th Cir 1972).

Descriptors: *Flood control, *Channel improvement, *Judicial decisions, *Legislation, *Flood protection, Water law, River basin development, Flood plain zoning, Legal aspects, Water resources development, Water policy, Flood plain, Comprehensive planning, Planning, Channelization, Water resources development.
Identifiers: Environmental Impact Statements.

The case challenges the Cache River-Bayou DeView Channelization Project. The project was authorized by the Flood Control Act of 1950. It called for clearing, realigning, enlarging and rechanneling portions of the Cache River and its tributaries. The plaintiff attacks the inadequacy of the environmental impact statement. Secondary questions charge violations of the Water Bank Act, the Fish and Wildlife Coordination Act or the Flood Control Act. The court held that it had a right to make a substantive review of the impact statement on the merits. The court stated that the complete formal impact statement represents an accessible means for opening up the agency decision-making process and subjecting that process to critical evaluation by those outside the agency. The court found the plaintiff's other contentions without merit and remanded the case to the District Court with instructions to require the Corps to submit a revised impact statement. (Gragg-Florida)
W74-12623

ADAMS V. MONTANA POWER CO. (ACTION TO DETERMINE ADMIRALTY JURISDICTION).
354 F Supp 1111 (D C Mont 1973).

Descriptors: *Montana, *Judicial decisions, *Navigable waters, *Water law, *Legal aspects, State jurisdiction, Federal jurisdiction, Jurisdiction, Interstate, Constitutional law, Regulation, Ships, Transportation, Navigation, Law enforcement, Rivers, Missouri River, Navigable rivers, Inland waterways, Water policy.

Action was brought against a power company for death of decedent drowned in a small boat which capsized in the discharge from the power company's dam on the river. The court held that the 25-mile navigable stretch of the Missouri River was used by small boats only and had nothing resembling traditional maritime activity thereon. Thus it was the type of water which the law of admiralty should govern and Montana courts could exercise jurisdiction over it and apply familiar concepts of Montana tort law. Under the 'locality rule', once rather generally accepted, if a tort occurred on what was a navigable water, then admiralty jurisdiction automatically followed. Admiralty law developed out of the need of commerce on the seas for a law which related to the needs of that commerce. Thus if the problem is what body of law should govern activities on water it is unrealistic to ignore facts regarding maritime activity. (Ritchie-Florida)
W74-12624

THE ROLE OF THE POLITICAL IDIOM IN JURISDICTIONAL CONFLICTS OVER OFFSHORE OIL AND GAS,
Johns Hopkins Univ., Washington, D.C. School of Advanced International Studies.
E. Treby.
Journal of Maritime Law and Commerce, Vol 5, No 2, p 281-297, January 1974. 57 ref.

Descriptors: *Offshore platforms, *Jurisdiction, *Oil exploration, *Oil industry, *Legal aspects, Economic aspects, Federal government, State governments, International law, International waters, Institutional constraints, Oceans, Geology, Natural resources, Water resources development, Court decisions, Minerals, Land ownership, Adoption of practices, Water resources, Planning, Coordination, Administration, Water law, Gasoline, Environmental effects.
Identifiers: *Coastal zone management, *Coastal zone.

Offshore wells are the source of an increasing percentage of new petroleum reserves. Continental shelves currently produce one-fifth of world petroleum output and are expected to increase that share to one-third within ten years. Geological surveys indicate that adequate reserves exist and can be found to meet future demand. The question is whether such reserves can be economically brought into production in the next decade. Beyond the need for new technology, there are legal and political disputes involving jurisdiction over off-shore minerals. These disputes take two forms: international disputes over a body of water bordered by two or more sovereign nations, or domestic disputes within federal systems between the central government and its constituent units. The U.S. Government was uninterested in exerting jurisdiction prior to the Truman Declaration of 1945. Before the doctrine Washington did not question state government ownership of submerged lands as established by Supreme Court decisions. Though the Truman Proclamation in itself only made statements about the shelf vis-a-vis other countries it signaled the beginning of federal control and end of state control of the sea bed. (Sperling-Florida)
W74-12625

6F. Nonstructural Alternatives

FLOOD PLAIN STUDIES IN ONTARIO,
Dillon (M. M.), Ltd., Toronto (Ontario).
F. I. Lorant.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 64-76, 1973. 6 plate.

Descriptors: *Flood plains, *Flood protection, *Flood plain zoning, *Non-structural alternatives, Mapping, Design storm, Flood frequency, Design flood, Canada.
Identifiers: *Ontario.

The Province of Ontario minimizes flood damages by the regulation of development in flood plains. Fundamental to the application of such preventive regulations is the accurate definition of the flood plain. Current procedures in Ontario for such flood plain studies including design frequencies, magnitude of regional design storms, and observed and estimated flood peaks are described. Commonly used photography and mapping scales and cost estimates are given. (See also W74-12087) (Knapp-USGS)
W74-12090

FLOOD CONTROL, NAVIGATION, AND OTHER ALTERNATIVE WATER RESOURCES POLICIES IN MINNESOTA,
Minnesota Univ., Minn. Dept. of Agricultural and Applied Economics.
J. J. Waelti.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 821, $3.25 in paper copy; $2.25 in microfiche. Minnesota Water Resources Research Center, St. Paul, Aug. 1974, Mimeographed Rept. 25 p, 3 ref. OWRT B-054-Minn(4), 14-31-0001-3601.

Descriptors: *Water resources, *Flood control, *Navigation, Environmental control, *Minnesota, *Water policy, Flood plains, Costs, Mississippi River, Legal aspects, Dredging, Alternate planning, Non-structural alternatives.
Identifiers: Flood costs.

Research was carried out in three areas of water resources in Minnesota: flood control, navigation, and general water policies. Research results indicate that governmental units were the ultimate bearers of nearly half of the flood costs in the Minnesota River Basin in the 1965 and 1969 floods. An incidence of costs analysis provides justification for the imposition of land-use restrictions in flood plains. Vigorous enforcement of the Minnesota 1969 Flood Plain Management Act which stresses non-structural solutions to flood problems is recommended. The current issues in commercial navigation which affect Minnesota basically involve a resolution of the conflict between developmental and environmental values; such is the issue of dredging to maintain the 9-foot navigation channel on the Upper Mississippi River. Without maintenance dredging, barge traffic would come to a halt on the Upper Mississippi causing irreparable economic harm. The Corps' present method of dredging and depositing of dredge spoil causes irreparable environmental damage by blocking the flow of backwater sloughs. However, the Corps is not ready to accept full responsibility for closure of these sloughs on the Upper Mississippi River. A possible alternative is for users of the 9-foot navigation channel to be required to pay the full costs of environmentally sound dredge spoil disposal. With a system of user charges in effect, environmental values would be better accounted for and barge transportation will be assigned to its most efficient position in the national transportation system. (Walton-Minnesota)
W74-12206

WATER RESOURCE AND HAZARD PLANNING REPORT FOR THE CLARK FORK RIVER VALLEY ABOVE MISSOULA, MISSOULA COUNTY, MONTANA,
Montana Univ., Missoula. Dept. of Geology.
R. J. Wheeler.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 041, $4.00 in paper copy, $2.25 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Completion Report No 51, July 1974. 75 p, 10 fig, 4 tab, 19 ref, 3 append. OWRT A-065MONT(1), 14-31-0001-3826.

Descriptors: *Flood plains, *River basin development, *Montana, *Water table, *Seismic waves, *Water level fluctuations, Aerial photography, *Planning, Flood frequency.
Identifiers: *Clark Fork River(Mont).

A 33-mile reach of the Clark Fork River east of Missoula, Montana, was the subject of a two-year hydrology and flood hazard study. The 100-year flood plain was delineated by a unique method incorporating aerial photographs obtained during a flood of known recurrence interval, and synthesized rating curves developed for several sites in the reach. The maps, which were developed at a cost of $120 per river mile, are believed to be nearly as accurate as maps obtained by more sophisticated and costly techniques. Water levels in 20 wells were monitored during a one-year period to determine piezometric surfaces and water table fluctuations. Gravity traverses were made to determine bedrock configurations and depths to bedrock. The seismic refraction method was used for calibration of depth calculations. (Williams-Montana State)
W74-12360

SOCIAL DIMENSIONS OF URBAN FLOOD CONTROL DECISIONS,
Utah State Univ., Logan. Inst. for Social Science Research on Natural Resources.
W. H. Andrews, and D. C. Geertsen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 037, $3.75 in paper copy, $2.25 in microfiche. Research Monograph No. 3, January 1974. 69 p, 5 fig, 22 tab, 42 ref, append. OWRT A-010-UTAH(2). 14-31-0001-3845.

Descriptors: *Flood control, *Decision making, Aesthetics, *Attitudes, Social values, Social aspects, Management.
Identifiers: *Social variables, *Urban flood control.

An exploratory study of the social variables that are likely to be important in making public decisions about controlling flood waters of local streams was made. In addition to discovery of social factors the objectives included description and measurement of attitudes, needs and actions related to the decision problem as well as analysis of certain institutional constraints or organizational problems of government agencies affecting the drainage decision process. Social factors identified related to several areas including flooding experience, awareness and information, level of concern, attitudes about flood management attitudes toward and knowledge about specific proposals, social participation, aesthetic, leisure and environmental measures and demographic characteristics. Numerous federal, state and local agencies are involved in flood control activities, some more directly than others. Central responsibility was mainly with the county and the Army Corps of Engineers. There was a high degree of interrelatedness among these agencies as well as conflicting differences. Home ownership, location of residence, length of residence, higher education and male sex were factors associated with higher awareness.
W74-12369

FLOOD PLAIN INFORMATION: KINGSLAND CREEK, CHESTERFIELD COUNTY, VIRGINIA,
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-12393

FLOOD PLAIN INFORMATION: OLDTOWN CREEK AND TRIBUTARY, CHESTERFIELD COUNTY, VIRGINIA,
Army Engineers District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-12394

FLOOD PLAIN INFORMATION: MAUMEE AND AUGLAIZE RIVERS, DEFIANCE, OHIO,
Army Engineers District, Detroit, Mich.
For primary bibliographic entry see Field 4A.
W74-12395

A PLAN FOR MICHIGAN'S SHORELANDS.
Michigan Dept. of Natural Resources, Lansing.
For primary bibliographic entry see Field 6E.
W74-12616

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL IMPACT ANALYSIS: THE EXAMPLE OF THE PROPOSED TRANS-ALASKA PIPELINE,
Geological Survey, Washington, D.C.
D. A. Brew.
Circular 695, 1974. 16 p, 3 fig, 8 ref.

Descriptors: *Alaska, *Oil fields, *Pipelines, *Environment, Environmental engineering, Planning, Frail lands, Social aspects, Economics.
Identifiers: *Environmental impact analysis, *Trans-Alaska pipeline.

The environmental impact analysis made as required by the National Environmental Policy Act of 1969 for the proposed trans-Alaska pipeline included consideration of the (1) technologically complex and geographically extensive proposed project, (2) extremely different physical environments across Alaska along the proposed route and elsewhere in Alaska and in Canada along alternative routes, (3) socioeconomic environment of the State of Alaska, and (4) a wide variety of alternatives. The environment was divided into two general parts--natural physical systems and superposed socioeconomic systems--and those parts were further divided into discipline-oriented systems or components that were studied and analyzed by scientistis of the appropriate discipline. Particular attention was given to potential feedback loops in the impact network and to linkages between the project's impacting effects and the environment. The principal unavoidable effects would be (1) disturbances of terrain, fish and wildlife habitat, and human environs, (2) the results of the discharge of effluent from the tanker-ballast-treatment facility into Port Valdez and of some indeterminate amount of oil released into the ocean from tank-cleaning operations at sea, and (3) the results associated with increased human pressures of all kinds on the environment. Comparison of alternative routes and transportation systems and of their environmental impacts provided information which indicates that one corridor containing both oil and gas pipelines would have less environmental impact than would separate corridors. (Knapp-USGS)
W74-12011

IMPACT OF RECENT ECONOMIC GROWTH AND INDUSTRIAL DEVELOPMENT ON THE ECOLOGY OF NORTHWEST MIRAMICHI ATLANTIC SALMON (SALMO SALAR),
Fisheries Research Board of Canada, St. Andrews (New Brunswick). Biological Station.
For primary bibliographic entry see Field 5C.
W74-12271

ECOSYSTEM MODELING OF A FORESTED RIVER BASIN,
Washington Univ., Seattle. Coll. of Forest Resources.
For primary bibliographic entry see Field 2A.
W74-12294

FIELD TEST OF AN ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY,
Georgia Inst. of Tech., Atlanta.
M. A. Smith.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 045, $5.75 in paper copy, $2.25 in microfiche. Report No ERC-1574, August 1974. 203 p, 15 fig, 11 tab, 44 ref.

Descriptors: *Environmental effects, Ecology, Evaluation, Aesthetics, Value, *Ecosystem, *Water quality, Air quality, *Land use, *Social aspects, Social impact.
Identifiers: *Environmental impacts, Noise.

The part of the National Environmental Policy Act of 1969 (NEPA), Public Law 91-190, which has received the most attention has been Section 102(2) (c), requiring the preparation of 'Environmental Impact Statements' for all Federally funded construction that may adversely affect the environment. In response to this requirement, many agencies have attempted to prepare methodologies for impact assessment. A field application is described of an environmental impact assessment methodology designed by Battelle Memorial Institute (Columbus Laboratories) for the Georgia Department of Transportation to one rail line of the planned Metropolitan Atlanta rapid transit system. The methodology, among the most rigourous and explicit of the available impact evaluation techniques, utilizes a number of value functions for converting information on a wide variety of dissimilar environmental effects to commensurable quantitative units. The conversion permits aggregation and evaluation of overall environmental impact and of tradeoffs among individual effects. Alternate value functions can be readily explored, and new ones can be added as desired. The methodology includes (1) a comprehensive checklist of 68 environmental factors, (2) a method for measuring the impact magnitude for each factor, and (3) value functions for weighing the importance of diverse impacts. A critical evaluation of the validity and usefulness of the method for incorporating environmental concerns into the planning-decision process shows one of the biggest problems to be prediction of the environmental conditions without the project. Several existing environmental assessment techniques are reviewed. (James-Georgia Tech)
W74-12357

PROCEEDINGS OF THE XV EUCEPA CONFERENCE ON HARMONIZING PULP AND PAPER INDUSTRY WITH ENVIRONMENT,
For primary bibliographic entry see Field 5G.
W74-12400

TECHNICAL REPORT FROM THE STOCKHOLM UN CONFERENCE,
Swedish Water and Air Pollution Research Lab., Stockholm.
S. Freyschuss.
In: Proceedings XV EUCEPA Conference on Harmonizing Pulp and Paper Industry with Environment; held in Rome, May 7 to 11, 1973, p 37-42, 1973.

Descriptors: *Conferences, *United Nations, *Organizations, *Environmental control, *Water pollution, *Air pollution, Water pollution control, Pollution abatement, Regulation, Legislation, Governments, Coordination, Cooperatives, Human resources, Ecology, Project planning, International Commissions.

Representatives of 113 nations, 16 interstate agencies, and about 250 international societies attended the United Nations Conference on the Human Environment, held June 5-16, 1972, which was concerned with global ecological problems. A major outcome was the adoption of a declaration on the human environment, embodying 26 guideline principles and 106 recommendations directed at national governments and international agencies regarding actions against further pollution of natural waters and the atmosphere. As a corollary, an environmental secretariat was established with headquarters in Nairobi for initiation and coordination of U.N. antipollution programs. (See also W74-12400) (Brown-IPC)
W74-12401

SURVEY OF ENVIRONMENTAL LEGISLATION IN THE GERMAN FEDERAL REPUBLIC (UEBERSICHT UEBER DIE UMWELTGESETZGEBUNG IN DER BUNDESREPUBLIK DEUTSCHLAND),
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
For primary bibliographic entry see Field 6E.
W74-12402

FRENCH LEGISLATION AND POLICIES REGARDING ENVIRONMENTAL PROTECTION (LEGISLATION ET POLITIQUE FRANCAISES EN MATIERE DE PROTECTION DE L'ENVIRONNEMENT),
Societe Aussedat-Rey, Saillat (France).
For primary bibliographic entry see Field 6E.

W74-12403

LEGISLATION ON ENVIRONMENTAL PROTECTION IN SCANDINAVIA,
National Water Board of Finland, Helsinki.
For primary bibliographic entry see Field 6E.
W74-12404

CANADA'S APPROACH TO ENVIRONMENTAL POLLUTION CONTROL FOR THE PULP AND PAPER INDUSTRY,
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5G.
W74-12405

FINAL CONFERENCE REPORT FOR THE NATIONAL CONFERENCE ON MANAGING THE ENVIRONMENT.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-227 033, $16.50 in paper copy; $2.25 in microfiche. Environmental Protection Agency, Washington, D.C., Office of Research and Development, (1974), 269 p.

Descriptors: *Environment, *Management, *Comprehensive planning, *Pollution, Ecology, Decision making, *Legal aspects, Local governments, State governments, Federal government, *Institutional constraints, *Intergovernmental relations.
Identifiers: Environmental quality.

The National Conference on Managing the Environment was held on May 14 and 15, 1973, in Washington, D.C. Approximately 350 persons, predominantly public officials of all levels of government, attended the discussions of various aspects of environmental management. The conference sessions covered the following topics: the environment--how comprehensive; interaction at the local level; a decision maker faces the environment; local government experience; regional government experience; legal and judicial constraints; public involvement; environmental technology; growth; standards; comprehensive planning; intergovernmental relations; and four technical workshops. The conference was sponsored by the Environmental Studies Division, Washington Environmental Research Center, U.S. Environmental Protection Agency. (See also W74-12458 thru W74-12478)
W74-12457

BEYOND THE BRUSHFIRES,
Environmental Protection Agency, Washington, D.C.
R. W. Fri.
Final Conference Report for the Environmental Protection Agency, Washington, D.C. National Conference on Managing the Environment, p I:4-I:7, 1974.

Descriptors: *Environmental control, *Air pollution, *Water pollution, *Comprehensive planning, *Operations research, Technology, Simulation analysis, Planning, Regulation, Social aspects, Systems analysis, Land use, Ecology.

Many environmental problems now dealt with on an emergency basis could have been predicted and resolved long ago. Automobile pollution projections could have been made in the 1950's. The information necessary to develop systems solutions to many ecological problems is available now. The situation in San Diego is illustrative. In 1971, 158,000 tons of volatile organic compounds were vaporized into the atmosphere. Regulations to minimize loss of gasoline created at transfer points were put into effect. Technology existed to minimize the vaporization. As a result, the county of San Diego will annually save 6.15 million gallons, which will more than pay the technology costs. Certain steps must be taken to insure optimum application of existing technical knowledge. Local governments must acquire a new level of expertise in areas like operations analysis, airshed models, land planning, and traffic simulation. Alliances must be formed in areas where environmental problems overlap jurisdictional lines. Diverse local agencies must be united for a coordinated effort on paoblems which do not have piecemeal solutions. Most importantly, the traditional American concept of growth will have to be reexamined. We will have to make do with less energy, smaller cars, and more personal restraints. We will realize our fundamental dependence on the biological world, and the necessity of stability in its maintenance. (See also W74-12457) (LaPointe-North Carolina)
W74-12458

MANAGEMENT FOR THE FUTURE,
Council on Environmental Quality, Washington, D.C.
R. E. Train.
Final Conference Report for the National Conference on Managing the Environment. Environmental Protection Agency, Washington, D.C., p I:8-I:12, 1974.

Descriptors: *Administration, *Decision making, *Management, *Monitoring, *Environmental control, *Environmental effects, Optimization, Technology, Ecology, Systems analysis, Alternative planning.
Identifiers: *National Environmental Protection Act(NEPA), *Public participation, Environmental Impact Statement(EIS).

An effective management system must possess two key elements: (1) the best information and feedback for decision making; and (2) follow-up decisions and tasks. Two essential information inputs to environmental decision making are monitoring and improvement of the data base, and citizen participation. Good monitoring data, in easily understandable forms, assures optimum achievement of goals. Further research is required in determining the health effects of pollutants, and economic and social impacts of various regulatory systems. Monitoring should go beyond the direct determination of pollutant concentrations to fish, wildlife, forests, and soils. The single most important input to the environmental management process is citizen participation, which the National Environmental Protection Act has sought to maximize. By open discussion of the alternatives with the public, a broader range of alternatives is made available. Goal setting must be carried out in full public view if confidence in the goals is to be assured. The environmental impact analysis has created a magnificent tool for furthering public comment. This analysis not only requires the presentation and elaboration of alternatives, but provides for multidisciplinary discussion which is essential to the resolution of complex problems. Another important reason for furthering public participation is to discourage the feelings of alienation and inevitability that the average citizen has as the complexity of problems increases. (See also W74-12457) (LaPointe-North Carolina)
W74-12459

THE ECONOMICS OF ECOLOGY,
Colorado Univ., Boulder.
K. E. Boulding.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p II:13 - II:17, 1974.

Descriptors: *Economics, *Ecology, *Speciation, *Niches, *Population, *Limiting factors, Competition, Goods, Ecosystems, Environment, Economic impact, Economic efficiency, Wastes, Equilibrium, Social aspects, Social values, Constraints, Trade associations.
Identifiers: Excretions.

The economic subsystem is a subset of the human social system and therefore of the total ecological system. Many material economic entities, such as automobiles and dollar bills, can be viewed as ecologic species in that they require both materials for growth (production), energy for mobility (fuel or muscular energy), and produce excretions (gaseous combustion products from automobiles). Because man possesses a nervous system which assimilates large quantities of knowledge and a mental faculty for analysis, he has an unusual capacity for cooperation with his own artifacts (wheat, machines, clothing, automobiles, etc.) with consequent continued expansion of the human niche and increased population growth. Humans compete with other species for a share in the total ecosystem. Almost all human economic activity produces both 'goods' and 'bads'. Beef production means polluting feedlots; power production, polluting power plants. The major problem is in insuring that private decisions which hope to maximize private benefits, also produce public benefits. Many current ecological problems, like wilderness preservation, cannot be resolved by reliance on the private marketplace. The question of how much further the human race can expand its ecological niche is dependent upon the type of economic and social structure (i.e. basic energy source, necessities, life styles), which can be sustained. The study of ecology can point out the limitations that the human niche does have at some point in time, in order to insure a stable and reasonably agreeable spaceship earth. (See also W74-12457) (LaPointe-North Carolina)
W74-12460

PLANNING FOR QUALITY GROWTH,
Hawaii State Dept. of Planning and Economic Development, Honolulu.
S. M. Mark.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. II:18-II:25. 1974.

Descriptors: *Land use, *Planning, *Hawaii, *Legislation, State governments, State jurisdiction, Environment, Land resources, Land classification, Land development, Federal government, Physical control.
Identifiers: *National Land Use Policy Act, *New Federalism.

The State of Hawaii passed a land use law in 1961 providing for classification of all public and private lands as urban, rural, agricultural or conservation, with a reclassification every five years, and assignment of the land uses permitted under each classification. As a result land speculation and scattered development have been greatly reduced and prime agricultural and conservation lands have been preserved. The Hawaiian experience offers many insights to states now embarking on land use programs of their own, and will be a helpful example when after passage of the National Land Use Policy Act, states are forced to undertake comprehensive planning. Much of the burden of defining specific goals and creating relevant organizational structures will be borne by the states with the incentive of federal funding. In the interim, before a national act is passed, states should develop their own planning capabilities and sort out the complex local jurisdictional problems that have historically impeded rational environmental management. Whereas environmental planning has centered around physical and spatial concerns, and economic and population questions, now focus must shift to 'quality growth,' or total environmental quality, encompassing social as well as economic criteria. A workable definition for quality growth, reflecting the proper balance of economic, social and environmental objectives, together with criteria for measuring such growth and methods for including public participation in the discussion now need urgent development by state planning councils. (See also W74-12457) (LaPointe-North Carolina)
W74-12461

ENVIRONMENTAL DECISION MAKING,
J. Wentz.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. II:26-II:31. 1974.

Descriptors: *Land use, *Environment, *Planning, *Decision making, Administration, *Arizona, Project planning, *Local governments, Zoning, City planning, Land classification, Land resources, Irrigation, Sewage effluents, Landfills, Recreation.
Identifiers: *Open space, *Phoenix(Ariz).

The goal of environmental management is defined as the creation and maintenance of a productive harmony between man and his environment. Productive harmony implies a balance between the quality of the surroundings and economic costs of that quality. Phoenix is taking positive steps to achieve this. In July, 1971, the City Council established a 21 member ongoing Environmental Quality Commission to identify problems and propose solutions, and aided by an environmental planner, many changes have already taken place at the local level. Hillside ordinances have been adopted to reduce density, visual pollution of signs is being heavily reduced, and backup treatment is now required for residential development insuring no more bleak backwalls along major streets. Tree planting programs are underway mostly in inner city areas and a major thrust is being directed to a new open space program including outlay of $40 million to buy the Phoenix Mountains in the central city, the land to be kept in its natural state to prevent dangerous development along the mountainsides. Various landfill projects together with the purchase of private lands will create parks. EPA is financing a study of converting Phoenix sewage plant effluent to a quality sufficient to use as truck farm irrigation, and another portion of sewage will cool a nuclear reactor now under construction. Environmental impacts of all projects must be determined prior to construction, however a more objective cost-benefit analysis is needed. (See also W74-12457) (LaPointe-North Carolina)
W74-12462

INCREMENTALISM AND ENVIRONMENTALISM,
Yale Univ., New Haven, Conn.
C. Lindblom.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. II:32-II:34. 1974.

Descriptors: *Planning, *Comprehensive planning, Alternate planning, Long term planning, Environment, Decision making, Social change.
Identifiers: *Incrementalism, *Selective planning.

The goal of comprehensive planning is an almost universally accepted axiom. However, such planning is by its very nature doomed to frustration and failure. Complexities of current problems which are cited as reasons for comprehensive planning serve only to limit the completeness or broadness of planning. The planner will never have enough information or the breadth of expertise to develop a comprehensive plan. Rather a selective approach to planning emphasizing discrimination, strategy, and flexibility in the face of errors must be developed. This would allow the decision maker room to maneuver, room to attack a particular problem from a high focus, and then to pull back and weigh new information gained in order to continue the attack. Broad planning practices can be hampered by the desire to apply the scientific method which is designed for mastering a narrow, well defined problem ignoring interrelated variables; reliance on conceptualization rather than the more painstaking selective approach; the conventional wisdom that we arrived at our environmental difficulties piecemeal and only some other method will extricate us (an idea strongly rejected); and the argument that only all-encompassing solutions are viable. (See also W74-12457) (LaPointe-North Carolina)
W74-12463

THE POSITIVE ROLE OF ENVIRONMENTAL MANAGEMENT,
Indiana Univ., Bloomington. Dept. of Political Science; and Indiana Univ., Bloomington. Dept. of Public and Environmental Affairs.
L. K. Caldwell.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. III:19-III:24. 1974.

Descriptors: *Environment, *Environmental effects, *Environmental control, *Administration, *Legislation, Land use, Planning, Pollution abatement, Federal government, Urban renewal, State government, Federal jurisdiction.

The public outcry for environmental enhancement in the 1960's spurred the formation of the Environmental Protection Agency and The Council on Environmental Quality, together with a variety of state and local agencies. While there have been some improvements, measures taken thus far have been mostly of a stopgap nature designed to prevent further environmental degradation and to preserve some land areas. The major task of restoring damage already inflicted upon the environment has not been addressed. The establishment of an Environmental Reconstruction Agency to pursue this goal is proposed. This agency would be a coherent system capable of deploying knowledge, manpower, and money in assisting local citizenry in fully analyzing environmental options. Especially critical areas could receive a national focus, e.g. the Southern Appalachians, the arid Southwest, and many inner cities. The agency would be responsible for restoring derelict land, the removal of decayed structures from urban areas, and the grouping of small settlements into more viable communities. The expertise of the Corps of Engineers could be enlisted. An initial budget might be of the order of $10 billion, with a like amount generated from local and state funds. Enactment of a national land use policy act would be a necessary forerunner of such an agency. (See also W74-12457) (LaPointe-North Carolina)
W74-12464

STATE GOVERNMENTS TACKLE POLLUTION,
Woodrow Wilson International Center for Scholars, Washington, D.C.
E. H. Haskell.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. III:25-III:33. 1974. 2 fig.

Descriptors: *State governments, *State jurisdiction, *Consolidation, *Administrative agencies, *Governmental interrelations, *Environmental control, Land use, Legal aspects, Water resources development, Water quality control, Reviews, Pollution abatement, Solid wastes, Adoption of practices.
Identifiers: Illinois Environmental Protection Act of 1970, Maryland Environmental Service, Class action lawsuits.

Many state governments are moving dramatically to develop the implementation capabilities they will need to carry out federally or state mandated environmental protection programs. Such governments are responding in a variety of ways from reorganizing old agencies to developing new ones. The most prevalent change has been the relocation of the many environmental functions of state government from scattered agencies into one comprehensive organization. Illinois, Minnesota, Wisconsin, Washington, and New York are some examples of this approach. Pollution control is the major focus of these new agencies. In many states the environmental department is overseen by an interagency or civilian board. These attempts at consolidation hopefully will allow for more comprehensive planning, minimize duplication, maximize efficiency, vocally advocate environmental issues, and build a stronger political base for environmental protection. Many of the myriad part-time review boards, which rule on environmental issues, are now full-time and equipped with staff, some have been phased out in favor of one administrator, and some are subject to the veto of an environmental commission. Some states have taken on entirely new functions in order to address environmental problems. Vermont and Maine have established land use control systems requiring permits to build or develop land. In Vermont this function is administered by the Agency of Environmental Conservation. The new Maryland Environmental Service has the authority to construct and operate waste treatment facilities previously a function solely under the direction of local governments. Class action lawsuits by private citizens have been authorized in Michigan and are under consideration in many other states. (See also W74-12457) (LaPointe-North Carolina)
W74-12465

REGIONAL ENVIRONMENTAL MANAGEMENT AND THE DECISION MAKING PROCESS,
San Diego County, Integrated Regional Environmental Management Project, Calif.
L. E. Coate.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. III:34-III:42. 1974. 3 fig.

Descriptors: *Regional development, *Regional analysis, *Decision making, *Economic impact, *Environmental management, Cost comparisons, Computer models, Carrying capacity, Planning, Short term planning, Long term planning, Land use, Local governments.
Identifiers: Environmental Impact Report, Integrated Regional Environmental Management Board(IREM).

Of the various levels of governmental agencies, those at the local level have undergone the least reorganization and been the least apt to apply new environmental management techniques. Because environmental problems lend themselves more to regional than local solutions, there has been considerable difficulty in determining by whom and how decisions are to be implemented and enforced. This has been complicated by the emergence of land use planning and transportation planning as major strategies replacing traditional abatement policies. Added to this is the conflict between the incremental decisions made in local situations and the regional planning process which is comprehensive and general. In order to equip themselves with the capabilities of responsibly managing the environment, local and regional agencies must develop a more incremental planning process, and this process must include land use considerations. The Environmental Impact Report, and permit systems such as those outlined in the California Coastal Zone Conservation Act are models of some of the elements of such a process. San Diego has developed a computer model incorporating both the environmental and economic impacts of proposed projects, which is being tested in four local developments. In addition, a computerized early warning system and an Environmental Review Board overseeing impact report preparation have been established. Refinements to the computer models will include data on the carrying capacity (optimum population) of San Diego County. Also an ideal index diagram of standardized format, incorporating all relevant environmental, economic, and social information is being evaluated. (See also W74-12457) (LaPointe-North Carolina)
W74-12466

A DESCRIPTION OF THE ENVIRONMENTAL PLANNING AND MANAGEMENT PROJECT,
Metropolitan Government of Nashville Davidson County, Tenn.
D. Battle.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. III:43-III:47. 1974.

Descriptors: *Environmental management, *Environmental control, *Planning, *Water quality control, *Priorities, Landfills, Land use, Solid wastes, Public benefits, Energy, Electric power, Electric power production, Conferences, Communication, Community development, *Tennessee.
Identifiers: Davidson County(Tenn), Environmental planning, Environmental Planning and Management Project(EPMP), Nashville(Tenn).

In 1963 Davidson County incorporated the city of Nashville, and the smaller surrounding communities, into one Metropolitan District with a centralized Metropolitan Government. Two service areas were defined, one of high density defined by the city limits of Nashville, one one comprising the entire 533 square miles of the county. In 1972, financed by a private grant, the Metropolitan Government established the Environmental Planning and Management Project (EPMP). Its objectives were to define environmental problems, establish priorities for their resolution, and develop within the local agencies the expertise necessary for their resolution. The EPMP consisted of representatives from the local government, the business community, and the academic community, and is designed to coordinate the varying interests and concerns of these three groups. Highest priority was given to the water quality degradation occasioned by the local meat packing industry, which generates 1/2-3/4 of the waste capacity of the already overloaded sewage treatment plant. Considerable improvement has been observed without noticeable economic damage. Another project undertaken was the study of a landfill on a diked flood plain. This yielded information on filling techniques, and showed no river pollution from the present methods. Even though Nashville will soon be using 720 of the daily 1200 tons of solid waste generated as fuel in a thermal transfer plant, the solid waste problem will continue to be very serious, and a minimum of 100 acres is currently needed for immediate use. (See also W74-12457) (LaPointe-North Carolina)
W74-12467

IMPLEMENTATION OF CITIZEN PARTICIPATION IN THE MUNICIPAL PROCESS,
Environmental Protection Agency, Washington, D.C. Technical Assistance Research Programs.
J. Goodman, J. Falkson, B. Mertens, and L. Happel.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. IV:10-IV:16. 1974. 8 ref.

Descriptors: *Federal Water Pollution Control Act, *Conferences, *Public rights, *Decision making, Planning.
Identifiers: *Citizen participation, *Public hearings, *Implementation, Advisory boards, Workshops, Municipal process.

The Federal Water Pollution Control Act stipulated that public participation should be provided for and encouraged prior to acceptance of a plan; i.e. local citizenry must be involved in goal setting and implementation procedures. Unless public participation is developed in a way allowing substantive input and a feeling of public satisfaction, frustration can result, culminating in political or legal conflict causing long expensive project delays. Mechanisms of public participation with the most widespread use are: (1) Public hearings, which often do not offer an opportunity of feedback from the decision maker to the public revealing the impact the hearing has had on the decision; (2) Advisory boards, serving as a communication bridge between officials and townspeople, and which may be hampered by members who lack the expertise necessary to evaluate technical information. Further, officials may be reluctant to accept the board's advice; (3) Workshops can be used to complement either hearings or advisory boards and should be organized around a particular project. Separate sessions for citizens and city officials should be held prior to joint sessions. Citizen workshops should focus on legal requirements, project details, and analysis of case studies pertinent to possible action. Planner workshops should emphasize implementation of participation, publicity for meetings and hearings, and previous case studies of citizen participation. Proper timing is essential; the public must be consulted prior to the decision making, if conflict is to be reduced and planning efficiency increased. (See also W74-12457) (LaPointe-North Carolina)
W74-12468

THE CONCEPT OF CARRYING CAPACITY,
Utah State Univ., Logan. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 6B.
W74-12469

FIXED VERSUS VARIABLE ENVIRONMENTAL STANDARDS,
MITRE Corp., McLean, Va.
R. Pikul.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. V:38-V:57. 1974. 2 fig, 4 tab, 27 ref.

Descriptors: *Environmental control, *Standards, *Variability, Administrative costs, State jurisdiction, Environmental effects, Fuels, Electric power production, Air pollution, Coals, Sulfur, Air pollution effects, Radiation, Economic impact, Social impact.
Identifiers: Fixed environmental standards, Variable environmental standards, Enforcement strategies.

While both water and air standards require a fixed time interval, attaining such standards can result in implementation procedures which allow great variation in enforcement. Actually today only the ambient air quality standards and the mobile source emission standards may be truly regarded as fixed. Variable standards have their basis in the variation of a number of factors which affect pollutant emission and the assimilative capacity of the environment. Such parameters include time, which is usually fixed by law; space (different geographical areas); source categories; individual emitters within source categories; and the use of resource receiving the waste. The latter parameter is especially important in the case of water standards with different uses requiring widely varying water quality. In order to meet the Ambient Air Quality standards, a number of states have employed variable controls in their implementation plans. Some objections to variable standards are the economic inequalities which would ensue if manufacturers of like commodities face different control costs, the high administrative costs of variable controls, and the administrative difficulty in the production of different products (e.g. automobiles) for use in different geographical areas. However the economic benefits and flexibility provided by variable controls might represent a greater overall benefit. For example, standards which considered time variations of assimilative capacity based on meteorologic changes would allow for more efficient allocation of low sulfur coal. High emission standards on major polluters might give a lower total cost solution than equalized emission standards on all polluters. (See W74-12457) (LaPointe-North Carolina)
W74-12470

ENFORCING ENVIRONMENTAL LAW IN THE CITY,
New York City Corporation Counsel.
For primary bibliographic entry see Field 6E.
W74-12471

THE STRATEGIC ENVIRONMENTAL ASSESSMENT SYSTEM (SEAS): A RESEARCH PROJECT,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-12472

THE DEVELOPMENT AND OPERATION OF A PROTOTYPE STATE ENVIRONMENTAL INFORMATION CENTER,
East Central State College, Ada, Okla. Environmental Information and Media Center.
For primary bibliographic entry see Field 10D.
W74-12473

COMMUNICATIONS IN ENVIRONMENTAL MANAGEMENT,
Metropolitan Regional Council, Inc., New York.
For primary bibliographic entry see Field 6B.
W74-12474

STATE RESPONSIBILITY IN MANAGING THE ENVIRONMENT,
Connecticut Dept. of Environmental Protection, Hartford.
For primary bibliographic entry see Field 6E.
W74-12475

HOW A REGIONAL ORGANIZATION ASSUMES ENVIRONMENTAL RESPONSIBILITY,
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 6E.
W74-12476

THE COOPERATIVE APPROACH TO ENVIRONMENTAL ENHANCEMENT,
State Univ. of New York, Albany.
J. F. Zimmerman.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. VII:19-VII:39. 1974. 9 tab, 14 ref.

Descriptors: *Environmental management, *Local governments, *Political aspects, *Regional development, *Water resources, Adoption of practices, Water management(Applied), Legal aspects, Economies of scale, Economic efficiency, Contract, Contract administration, Governmental interrelations.
Identifiers: Service agreements, Opinion poll.

Service agreements which exploit economies of scale between local and/or county governments have become much more popular in the past 25 years, mainly due to easing of statutory restrictions and recent state incentives established to encourage cooperation between governments. The regional character of environmental management should increase emphasis on service agreements. A written questionnaire, designed to ascertain the extent of an attitudes toward service agreements, has 2375 municipalities responding out of a possible 5900. Conclusions were that 60% of the governments engage in such agreements, with only one service usually involved, and that council-manager governments enter into service agreements more frequently than other forms of municipal administration. Widespread and successful use of multi-lateral service agreements as determined by a metropolitan planning commission, council of governments or the state may create additional problems. First, expanded use could add to the burden of complexity already harassing

local governments. Secondly, service agreements could strengthen the fragmented governmental system and further encourage the fiscal disparity between nonviable, tax benefiting 'paper' communities and larger tax poor urban areas. Service may, in the end, only serve to impede the formation of metropolitan government and act as a stopgap measure for resolving major problems. This could lead to increased pressure for federal and state government action. (See also W74-12457) (LaPointe-North Carolina)
W74-12477

MANAGING AT THE LOCAL LEVEL,
International City Management Association, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-12478

BEECH CREEK, MT. VERNON, OREGON, FLOOD CONTROL CHANNEL (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W74-12599

OSWEGO STEAM STATION, UNIT 6, NIAGARA MOHAWK POWER CORPORATION, OSWEGO HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Buffalo, N.Y.
Available from the National Technical Information Service, Springfield, Va 22161 as EIS-NY-73-0895-F; $16.25 in paper copy; $2.25 in microfiche. March 29, 1973. 284 p, 54 fig, 37 tab.

Descriptors: *Environmental effects, *Electric power production, *Steam turbines, *Water pollution, *Electric generators, Electric power, Steam, Stations, Thermal power, Thermal water, Thermal pollution, Federal government, Administrative agencies, Water pollution sources, Air pollution, Water temperature, Fuels, Oil, *New York, Generators, Lake Ontario, Electric power demand, Power operation and maintenance, Ecosystems, Pollution.
Identifiers: *Environmental Impact Statements, *Oswego(NY), National Environmental Policy Statement.

The project proposes the construction of a sixth oil-fueled steam electric generating unit with intake and discharge structures, and other appurtenances. The Oswego Steam Station is located on 91 acres of land in Oswego, New York, on the shores of Lake Ontario. The new unit is necessary to meet New York's increasing power supply demands. The environmental impacts include occupation of ten acres of land, discharge of quantities of heat, air-borne emissions, liquid effluents, and sound energy as well as receipt and consumption of 9 million barrels of fuel oil per year. These are all adverse effects to some degree. Alternatives are no action, location elsewhere, purchase of power, hydroelectric instead of steam electric generation, use of other fuels or use of other cooling systems to minimize thermal pollution. The present proposal is less expensive, more efficient and minimizes deleterious effects to the environment. Irretrievable commitments include labor, materials and fuel consumption. Comments from government and citizen groups were received and considered. (Dillingham-Florida)
W74-12600

BAKER LAKE WATERSHED PROJECT, FALLON COUNTY, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Bozeman, Mont.
For primary bibliographic entry see Field 4A.
W74-12601

WATER BANK ACT--REPORT.
Committee on Agriculture and Forestry (U.S. Senate).
For primary bibliographic entry see Field 6E.
W74-12610

SURVEY OF ENVIRONMENTAL LEGISLATION,
A. C. Jacobson.
University of Miami Law Review, Vol 26, No 4, p 778-803, Summer 1972. 276 ref.

Descriptors: *Florida, *Legislation, *Political aspects, *Environmental sanitation, *Federal government, Government finance, Oil industry, Oily wastes, Social aspects, Measurement, Wildlife conservation, Water pollution control, Conservation, Coordination, Ecology, Water resources development, Water law, Administration, Statutes, Institutional constraints, Planning, Recreation demand, Industrial waste, Aesthetics, Environmental effects.
Identifiers: *Coastal zone management.

Legislation in the Florida Statutes dealing with the environment is described. The legislation passed in 1970 and 1971 reflected the growing concern for the public for protective measures. Some concern has stemmed from damaging oil spills that have occurred in recent years. In 1970 and Oil Spill Prevention and Pollution Control Act as well as the State Wilderness System Act was passed. The Florida Litter Law of 1971, the Environmental Protection Act of 1971, and chapters 71-203 and 71-36 represent some of the major legislative actions involving current environmental problems. The educational facilities of the state regarding environmental studies received a boost when five acres of spoil island were made available for a marine shore facility. It is necessary to work in conjunction with adjacent states as well as the federal government to attack common problem areas. If the legislature is responsive to the needs and demands of the public, then the increase in legislation also points out the awareness of the public to environmental needs. (Sperling-Florida)
W74-12618

DEEPWATER PORTS.
For primary bibliographic entry see Field 6E.
W74-12619

CORPS OF ENGINEERS DREDGE AND FILL JURISDICTION: BUTTRESSING A CITADEL UNDER SIEGE,
For primary bibliographic entry see Field 5G.
W74-12620

ENVIRONMENTAL DEFENSE FUND V. FROEHLKE (REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENTS).
For primary bibliographic entry see Field 6E.
W74-12623

SOWASHEE CREEK WATERSHED, LAUDERDALE COUNTY, MISSISSIPPI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-12626

7. RESOURCES DATA

7A. Network Design

THE DESIGN OF RAINFALL NETWORKS IN TIME AND SPACE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2B.
W74-12312

INTEGRODIFFERENTIAL EQUATIONS FOR SYSTEMS OF LEAKY AQUIFERS AND APPLICATIONS 2. ERROR ANALYSIS OF APPROXIMATE THEORIES,
Universidad Nacional Autonoma de Mexico, Mexico City. Centro de Investigacion en Matematicas Aplicadas y Sistemas.
For primary bibliographic entry see Field 2F.
W74-12333

7B. Data Acquition

GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO USING ERTS-1 DATA: PROGRESS REPORT II.
Colorado School of Mines, Golden. Dept. of Geology.
Available from NTIS, Springfield, Va. 22161 as N73-27289, Price $4.50 printed copy; $2.25 microfiche. Progress Report for June 31-November 11, 1972 for Goddard Space Flight Center, December 1972. 43 p, 9 fig, 3 tab. NASA Contract NaS5-21778.

Descriptors: *Geologic mapping, *Remote sensing, *Satellites(Artificial), *Water resources, Mapping, Photogrammetry, Terrain analysis, Structural geology, *Colorado.

Preliminary geologic interpretations of ERTS-1 scenes in central and western Colorado indicate that lithologic discrimination and structural interpretation can be made on ERTS-1 images. Generally, lithologic units are composed of 2 or more recognized geologic formations and should more correctly be referred to as remote sensing units. Faults mapped on ERTS-1 images in western Colorado correspond well with faults mapped on the geologic map of Colorado (1:500,000). Stratigraphic offset was easily detected along faults as short as 3 km; faults as short as 1/2 km should be identifiable. Several previously unmapped major linear features, possibly faults, were detected and mapped. Stereoscopic analysis of ERTS-1 imagery greatly enhances the capability of the interpreter. Structural features and lithologic contacts are more accurately traced and more remote sensing units can be defined. Ambiguous or questionable structural interpretations are commonly quickly resolved by stereoscopic analysis. (Knapp-USGS)
W74-12016

CHARACTERISTICS OF SEA ICE, LAKE ICE AND PERMAFROST USING AN IMPULSE RADAR SYSTEM,
Geophysical Survey Systems, Inc., Worth Billerica, Mass.
For primary bibliographic entry see Field 2C.
W74-12053

ERTS-1 APPLICATIONS IN HYDROLOGY AND WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
V. V. Salomonson, and A. Rango.
Available from NTIS, Springfield, Va 22161 N73-23468, Price $3.25 printed copy; $2.25 microfiche. NASA Technical Memorandum X-66237, May 1973. 24 p, 6 fig, 25 ref.

Descriptors: *Remote sensing, *Hydrologic data, *Telemetry, *Satellites(Artificial), Data collections, Mapping, Surveys, Floods, Glaciers, Turbidity, Path of pollutants, Monitoring.
Identifiers: ERTS.

The Earth Resources Technology Satellite (ERTS-1) provides very applicable data for effective monitoring and management of surface water features over the globe. Mapping flooded areas, snowcover, and wetlands and surveying the size, type, and response of glaciers to climate are

among the specific areas where ERTS-1 data have been applied. Turbidity variations in lakes and rivers have been observed and related to shoreline erosion, industrial plant effluent, and overall water quality. In addition the Data Collection System (DCS) is a reliable tool for gathering hydrologic data from remote regions. (Knapp-USGS)
W74-12062

ANALYSIS OF SOME METHODS FOR OBTAINING SEA SURFACE TEMPERATURE FROM SATELLITE OBSERVATIONS,
Goddard Space Flight Center. National Aeronautics and Space Administration, Greenbelt, Md.
For primary bibliographic entry see Field 7C.
W74-12063

BAILEY OIL CONTENT MONITOR,
Esso Research and Engineering Co., Floram Park, N.J.
For primary bibliographic entry see Field 5A.
W74-12066

A FEASIBILITY STUDY OF USING REMOTELY SENSED DATA FOR WATER RESOURCE MODELS,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 2A.
W74-12072

THE INTERDEPENDENCE OF LAKE ICE AND CLIMATE IN CENTRAL NORTH AMERICA,
Wolf Research and Development Corp., Riverdale, Md.
For primary bibliographic entry see Field 2C.
W74-12074

INSTRUCTION MANUAL FOR EXPENDABLE DEW POINT HYGROMETER.
EG and G International, Inc., Waltham, Mass. Environmental Equipment Div.
For primary bibliographic entry see Field 2B.
W74-12078

FLOW VISUALIZATION USING A SELECTIVITY SENSITIVE FLUORESCENT DYE,
Aerospace Research Labs., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 2E.
W74-12080

DETERMINATION OF TRACE METAL POLLUTANTS IN WATER RESOURCES AND STREAM SEDIMENTS,
Dayton Univ., Ohio.
For primary bibliographic entry see Field 5A.
W74-12194

MICROWAVES, A NEW TOOL FOR FOREST AND WATERSHED MANAGEMENT,
Montana State Univ., Bozeman. Dept. of Electrical Engineering.
B. R. McLeod.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 830, $3.25 in paper copy; $2.25 in microfiche. Montana Water Resources Research Center, Bozeman, Completion Report No. 53, June 1974. 26 p, 15 fig, 17 ref. OWRT A-061-Mont(1), 14-31-0001-3826.

Descriptors: *Moisture meters, *Microwaves, *Forest management, *Montana, *Watershed management, Measurement, Instrumentation.
Identifiers: Controlled burns.

Microwave absorption due to a molecular resonance in water offers a possible means of measuring moisture content in various materials. This report discusses the results obtained from the first two years of a continuing research program designed to explore the uses of microwaves as a forest and watershed management tool. Two battery-powered, portable microwave moisture meters consisting of modulator, Gunn oscillator, precision attenuator, horn antennas, detector, and stable amplifier were developed. One meter was equipped with visual display, the other with dual-track recorder. The meters were tested at a study site on the Lubrecht State Forest near Missoula, Montana from June to September 1972 and 1973. The meters were used extensively to obtain basic data and to provide fuel moisture data for prescribed burns; the data were compared for litter, sticks and duff. Oven drying was used as a standard to evaluate the reliability of the meter. The meters gave consistent results agreeing with the oven dry measurements within plus or minus 3 percent. Results of the study to date have demonstrated the feasibility and usefulness of microwave moisture sensing as a valuable tool in watershed management. The portable meters allow rapid, on-site measurement of fuel moisture content just before and even during prescribed burns. Both types of gear are still in the development stage, but two of the display-equipped meters are already being used by the U.S. Forest Service.
W74-12205

COMPARISON OF GERMANIUM DETECTORS FOR NEUTRON ACTIVATION ANALYSIS FOR MERCURY,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W74-12220

AN IMPROVED METHYLTHYMOL BLUE PROCEDURE FOR AUTOMATED SULFATE DETERMINATION,
Georgia Univ., Athens. Inst. of Ecology.
For primary bibliographic entry see Field 2K.
W74-12228

ARCHAEOLOGICAL SURVEY IN THE TOMBIGBEE RIVER DRAINAGE AREA: MAY-JUNE, 1970,
Mississippi State Dept. of Archives and History, Jackson.
S. O. McGahey.
Mississippi Archaeological Survey Preliminary Report No 2, Jackson, 1971. 33 p, 5 fig.

Descriptors: *Archaeology, *Data collections, *Water resources development, *Mississippi, Conservation, Regional development, Preservation, History.
Identifiers: *Tombigbee River Valley.

Part of the activities of the Tombigbee River Valley Water Management District has been to protect existing natural resources. The Mississippi Department of Archives and History conducted an archaeological survey in the 12-county area of the District. Although the survey was brief, 77 sites were identified and described. The location and historic value of these sites will enter into future considerations for water resource development projects, as many of the sites are of such significance that they deserved to be saved and, possibly, developed as historic sites. It is recommended that further archaeological information be researched on the sites described and that further research be undertaken to discover other sites. It is also recommended that the Tombigbee River Valley Water Management District give careful consideration to developing the sites and protecting them against possible destruction from work on projects of the District. (Poertner)
W74-12240

A TEMPERING RESERVOIR AND MANIFOLD FOR FLOWING-WATER AQUARIUMS,
National Marine Fisheries Service, Oxford, Md. Middle Atlantic Coastal Fisheries Center.
H. S. Tubiash.
The Progressive Fish-Culturist, Vol 36, No 2, p 114, April 1974. 2 fig.

Descriptors: Technology, *Temperature control, Laboratory tests, Temperature, Methodology, Continuous flow, Sea water, Equipment.
Identifiers: *Tempering reservoirs.

A simple device for supplying warmed flowing sea water for the laboratory study of aquatic and marine fauna is described. The unit can elevate the temperature of water flowing through at the rate of 1 liter per minute approximately 15C. (Katz)
W74-12257

A PORTABLE APPARATUS FOR PRESSURE SIEVING BOTTOM SAMPLES,
Southern Illinois Univ., Carbondale. Fisheries Research Lab. and Dept. of Zoology.
R. C. Heidinger, and J. B. Stahl.
The Progressive Fish-Culturist, Vol 36, No 2, p 116-117, April 1974.

Descriptors: *Sampling, *Bottom sampling, *Sieves, On-site data collections, Benthos, Sediments, Technology, Methodology, Design, Equipment.
Identifiers: *Pressure sieving.

A compact, lightweight apparatus suitable for pressure sieving bottom samples from a small boat is described. Pressure sieving is faster and more convenient than flotation sieving. The process and specifics of this unit are detailed. The procedures does not seem to bias the sampling according to comparisons with flotation-sieved samples. (Katz)
W74-12258

AN IMPROVED CHEMICAL DELIVERY APPARATUS FOR USE IN INTERMITTENT FLOW BIOASSAYS,
Bureau of Sport Fisheries and Wildlife, Warm Springs, Ga. Southeastern Fish Control Lab.
J. H. Chandler, Jr., H. O. Sanders, and D. H. Walsh.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 123-128, July 1974. 1 fig, 5 ref.

Descriptors: Technology, *Design, Bioassays, Analytical techniques, Methodology, Laboratory tests, Flow systems, Pollutant identification.
Identifiers: *Intermittent-flow bioassay.

An apparatus designed to eliminate the difficulties previously encountered in intermittent-flow toxicant systems is described. It is easily adapted for use on existing diluters, has no moving parts, and is easily constructed of readily available materials. Variation in delivery volume is easily achieved by varying the volume of the device. The metering device consists basically of a 15-ml conical centrifuge tube that is filled with two siphons and a capillary tube. A diagram and complete specifics for construction and operation are given. Tests indicate that this apparatus is consistently very accurate. (Katz)
W74-12272

ACCURACY OF PRECIPITATION MEASUREMENTS FOR HYDROLOGIC MODELING,
Silver Spring, Md. National Weather Service, Hydrologic Research and Development Lab.
For primary bibliographic entry see Field 2B.
W74-12304

A TECHNIQUE TO OBTAIN ICE MOVEMENT,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 2C.
W74-12314

COLUMN SCANNING WITH SIMULTANEOUS USE OF 241AM AND 137CS GAMMA RADIATION,
Agricultural Univ., Wageningen (Netherlands).
For primary bibliographic entry see Field 2G.
W74-12319

POTENTIAL OF GEOPHYSICAL METHODS FOR STUDYING FRESH-WATER DISCHARGES IN THE COASTAL ZONES OF SEAS,
For primary bibliographic entry see Field 2L.
W74-12329

THE POTENTIAL OF METEOROLOGICAL SATELLITE CLOUD OBSERVATIONS FOR DELINEATION OF SIGNIFICANT FEATURES OF COASTAL UPWELLING OFF OREGON,
Earth Satellite Corp., Washington, D.C.
J. M. Meneely, and E. S. Merritt.
Available from NTIS, Springfield, Va 22161, as COM-73-10896, Price $3.00 printed copy; $2.25 microfiche. Final Contract Report for National Oceanic and Atmospheric Administration, March 1973. 97 p, 39 fig, 2 tab, 3 ref, 2 append. NOAA Contract 2-35462.

Descriptors: *Remote sensing, *Ocean circulation, *Cloud cover, *Oregon, Currents(Water), Clouds, Oceanography, Fog, Satellites(Artificial).
Identifiers: Upwelling(Oceanography).

Upwelling of subsurface water along the central Oregon coast was studied by analysis of satellite-observed cloud patterns. Sea-surface temperature distributions were compared with observed cloud patterns for a major upwelling event in late August 1972. Both the region of coldest water and the coastal fog band tended to broaden toward the south, but the temperature value could not be directly related to the extent of the fog area. A persistent, eddy-like feature was observed in the sea-surface temperature distribution, but it appears that such small-scale irregularities in the temperature field do not in themselves produce visible cloud features except in the case of thin shallow fog. The duration of the nightime land breeze and the strength of the daytime northerly wind component appear to play major roles in determining whether or not coastal fog occurs during the day. The onset, existence, and cessation of upwelling are related to several recognizable cloud situations. Satellite imagery can provide a basic tool for monitoring upwelling off Oregon. (Knapp-USGS)
W74-12338

ECOLOGICAL ASPECTS OF AQUATIC BIOLOGY THROUGH TIME-LAPSE PHOTOGRAPHY,
Maryland Univ., Solomons. Center for Environmental and Estuarine Studies.
For primary bibliographic entry see Field 5C.
W74-12345

BOTTOM PHOTOGRAPHS OF BLACK SEA,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 2J.
W74-12386

WAVE ENERGY CONVERTER ARRAY,
Laitram Corp., New Orleans, La.
J. M. Lapeyre.
U.S. Patent No 3,818,703, 5 p, 7 fig; 4 ref; Official Gazette of the United States Patent Office, Vol 923, No 4, p 1286, June 25, 1974.

Descriptors: *Patents, *Waves(Water), Equipment, Gravity waves, Ocean waves.
Identifiers: *Wave energy, *Power sources, *Energy sources.

The apparatus for converting the energy of surface waves in a liquid such as an ocean, comprises an array of buoyant helical members mounted for rotation about an axis. The pitch of the helical members equals or is greater than the length of the expected waves and the members are floated on the surface with their axes oriented so that wave length of the waves matches the pitch of the helices times the cosine of the angle between the helical axes and the direction of wave propagation. In one embodiment the array is a large chevron formed of two groups of helical members and is pivotable about the apex of the chevron. In another embodiment the helical members are arranged in zig-zag fashion. Means are provided for adjusting the angles between the arms of the chevron in the one case, and the adjacent arms of the zig-zag in the other case. The helical members can be coupled to one or more driven systems, such as electrical generators or friction boilers. (Sinha-OEIS)
W74-12438

INTRODUCTION TO BASIC REMOTE SENSING FOR ENGINEERING GEOLOGISTS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
P. J. Tarkoy.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-224 754; $4.75 in paper copy, $2.25 in microfiche. June, 1971. 169 p, 13 fig, 10 tab, 305 ref, append.

Descriptors: *Remote sensing, Cameras, Electromagnetic waves, Exploration, Geophysics, Instrumentation, Photography, Films, Polarity.
Identifiers: *Electromagnetic radiation, Microwave, Radiometers, Scanners, Electromagnetic spectrums, Polarization, Bands.

The object is to present a technical discussion of the theory of the electromagnetic spectrum and relevance to remote sensors, describe the bands and sensors used in application, and relate how they can be useful in engineering geology and geological exploration. Discussions of each sensor's capabilities, most useful application, and examples of past experiences are also included. Discussed are electromagnetic radiation--its spectrum, interaction with the atmosphere and with geologic materials, its reflections and changes in polarization; photographic spectrum, photographic sensors; procurement of data; non-photographic spectrum; non-photographic sensors--radiometers, scanners, active microwave, passive microwave and other types; and general applications of remote sensors. (Campbell-NWWA)
W74-12553

OIL/WATER INTERFACE DETECTOR LABORATORY EVALUATION,
Esso Research and Engineering Co., Florham, N.J.
For primary bibliographic entry see Field 5A.
W74-12637

BIOASSAY DILUTER CONSTRUCTION,
Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.
For primary bibliographic entry see Field 5A.
W74-12646

CALCULATION OF WATER TEMPERATURE OF RIVERS,
Moncton Univ. (New Brunswick). Dept. of Engineering.
N. Marcotte, and V. L. Duong.
J Hydrol (Amst). Vol 18, No 3/4, p 273-287. 1973. Illus. English summary.
Identifiers: *Canada, Rivers, *Water temperature, Chaudiere River(Que), Du Nord River(Que).

Water temperature was calculated at hourly intervals for periods of several consecutive months in Chaudiere and Du Nord rivers, Quebec, Canada. Calculations were made by the thermal budget method using routine meteorological and hydrological observations from nearby stations. Hourly observations of water temperature for 112 consecutive days on Du Nord river were compared with hourly calculated values: the maximum difference is 3.3C, the overall figure is 1.2C and the maximum mean monthly difference is 0.9C. Comparable results were obtained for Chaudiere river. A discussion follows on method, results and differences between the 2 rivers.--Copyright 1974, Biological Abstracts, Inc.
W74-12707

A MINIATURE GRAVITY-FED THERMOCOUPLE PSYCHROMETER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
S. T. Mitchell, B. A. Kimball, and W. L. Ehrler.
Agron J. Vol 65, No 2, p 238-239. 1973. Illus.

Descriptors: *Hygrometry, *Humidity, Measurement, Instrumentation.
Identifiers: Gravity, *Psychrometer, Thermocouple.

A miniature gravity-fed thermocouple psychrometer was constructed and tested over a wide range of humidities and flow rates. The unit gave accurate wet bulb depression in 6-mm flow tubes through an acrylic plastic block with a minimum flow rate on only 0.06 m/sec at 35% RH (relative humidity) and of only 0.09 m/sec at 11% RH. The psychrometer also agreed exactly with a standard psychrometer (Assmann type) in open air without forced ventilation or radiation shielding.--Copyright 1973, Biological Abstracts, Inc.
W74-12747

7C. Evaluation, Processing and Publication

COMPUTER MANAGEMENT OF A COMBINED SEWER SYSTEM,
Municipality of Metropolitan Seattle, Wash.
For primary bibliographic entry see Field 5D.
W74-12003

GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO USING ERTS-1 DATA: PROGRESS REPORT II.
Colorado School of Mines, Golden. Dept. of Geology.
For primary bibliographic entry see Field 7B.
W74-12016

HYDROLOGIC DATA FOR LITTLE ELM CREEK, TRINITY RIVER BASIN, TEXAS, 1972,
Geological Survey, Austin, Tex.
B. B. Hampton.
Open-file report, May 1974. 74 p, 2 fig, 3 tab.

Descriptors: *Basic data collections, *Small watersheds, *Texas, *Rainfall-runoff relationships, *Hydrologic data, Streamflow, Data collections, Stream gages, Discharge(Water), Storm runoff.
Identifiers: *Little Elm Creek(Tex).

Rainfall, runoff, and storage data were collected during the 1972 water year for the 75.5-square-mile area above the stream-gaging station Little Elm Creek near Aubrey, Texas. The investigation is scheduled to continue through a period of both above- and below-normal precipitation to define the various factors used in the analyses of rainfall-runoff relationships. The stream has mostly a straight course, although in detail it is distinctly sinuous, with old channels, cutoff meander loops, and the remnants of several oxbow lakes present in the lower reach. The stream has a wide flood plain in the lower half of the watershed. The climate of the study area is temperate and subhumid. (Knapp-USGS)
W74-12055

WATER RESOURCES OF THE POWDER RIVER BASIN AND ADJACENT AREAS, NORTHEASTERN WYOMING,
Geological Survey, Washington, D.C.
W. G. Hodson, R. H. Pearl, and S. A. Druse.
Hydrologic Investigations Atlas HA-465, 1973. 4 sheets, 9 fig, 11 tab, 4 maps, 70 ref.

Descriptors: *Water resources, *Wyoming, *Groundwater, *Surface waters, Water quality, Water yield, Data collections, Hydrological data, Streamflow, Hydrogeology, Groundwater basins.
Identifiers: *Powder River Basin(Wyoming).

General information is given concerning the availability and quality of groundwater resources of the Powder River Basin, Wyoming, in a 4-sheet hydrological atlas. The Powder River Basin is a structural and topographic basin bounded on the west by the Bighorn Mountains, on the southwest by the Casper arch, on the east by the Black Hills, and on the south by the Laramie Range and Hartville uplift. Mean annual precipitation decreases basinward from 16.32 inches at Sundance and 15.91 inches at Sheridan to 14.00 inches at Gillette and 11.80 inches at Casper. Potential evaporation is high, especially in the Powder River Basin, and is several times the precipitation; consequently, much snow, surface water, and soil moisture evaporate to the atmosphere. Alluvium along irrigated valleys is recharged in part from irrigation water. Some movement of water between formations probably occurs in the subsurface. Discharge is mainly by evaporation, seepage to springs and lakes, transpiration by plants, and pumpage from wells. Most groundwater development has been for stock and domestic purposes, and wells are usually drilled and developed to supply water sufficient for these needs only. The quality of groundwater ranges from good to highly mineralized. Dissolved solids can be expected to be less than 100 mg/l in water from igneous and metamorphic rocks of Precambrian age and from intrusive igneous rocks of Tertiary age. The average rate of discharge per square mile is shown on a map for each station. The yields from the nonmountainous drainage basins (Belle Fourche River, Cheyenne River, and the southern and eastern parts of the Powder River Basin) generally are less than 0.05 cfsm (cubic feet per second per square mile), and from the mountain stations generally are more than 0.3 cfsm. Discharge from streams in the nonmountainous areas is greatly affected by storage in stockwater reservoirs and by the variable pattern of thunderstorm activity over the area. (Knapp-USGS)
W74-12056

A NUMERICAL MODEL OF MATERIAL TRANSPORT IN SALT-WEDGE ESTUARIES, PARTS I AND II,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 2L.
W74-12057

DRAINAGE AREAS OF TEXAS STREAMS, GUADALUPE RIVER BASIN.
Geological Survey, Austin, Tex.
Open-file report, August 1974. 24 p, 1 fig, 1 tab.

Descriptors: *River basins, *Drainage area, *Texas, Data collections, Hydrologic data.
Identifiers: *Guadalupe River basin(Tex).

Drainage areas are determined by measurements at 214 points within the Guadalupe River basin, Texas. The latitude and longitude of the points of determination and the drainage area in square miles above each point are tabulated. (Knapp-USGS)
W74-12060

ERTS-1 APPLICATIONS IN HYDROLOGY AND WATER RESOURCES,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W74-12062

ANALYSIS OF SOME METHODS FOR OBTAINING SEA SURFACE TEMPERATURE FROM SATELLITE OBSERVATIONS,
Goddard Space Flight Center. National Aeronautics and Space Administration, Greenbelt, Md.
J. C. Price.
Available from NTIS, Springfield, Va 22161 as N73-23467, Price $3.25 printed copy; $2.25 microfiche. NASA Technical Memorandum NASA-TM-X-66235, April 1973. 20 p, 2 fig, 1 tab, 18 ref.

Descriptors: *Remote sensing, *Satellites(Artificial), *Water temperature, Sea water, Clouds, Water vapor, Solar radiation, Infrared radiation.

Satellite measurements of sea surface temperature must be corrected for atmospheric moisture, cloud contamination, reflected solar radiation and other sources of error. Procedures for reducing errors are discussed. Routine accuracies of 1 deg are possible, given low noise spectral measurements in the infrared. (Knapp-USGS)
W74-12063

HYDROGEOLOGIC DATA FROM GREELEY, WICHITA, SCOTT AND LANE COUNTIES, KANSAS,
Geological Survey, Garden City, Kan.
For primary bibliographic entry see Field 4B.
W74-12068

WATER QUALITY AND RELATED STUDIES, JACKSONVILLE AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-12077

SOLMNEQ: SOLUTION-MINERAL EQULIBRIUM COMPUTATIONS,
California Univ., Berkeley. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 2K.
W74-12086

NUMERICAL ANALYSIS OF GROUNDWATER FLOWS,
FENCO, Toronto (Ontario).
For primary bibliographic entry see Field 4B.
W74-12104

COMPUTER USES IN WATER SYSTEMS: CONFERENCE REPORT.
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 6A.
W74-12107

STORET-THE EPA WATER QUALITY DATA SYSTEM,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6A.
W74-12108

COMPUTER USES IN WATER SYSTEMS: CONFERENCE PAPERS.
Water Research Association, Marlow, (England).
For primary bibliographic entry see Field 6A.
W74-12109

COMPUTER BASED MANAGEMENT SYSTEMS--OPPORTUNITIES IN THE NEW ORGANIZATION,
For primary bibliographic entry see Field 6A.
W74-12110

ASPECTS OF MONITORING AND CONTROL OF WATER QUALITY,
Great Ouse River Authority (England).
For primary bibliographic entry see Field 5A.
W74-12117

COMPUTER INVESTIGATIONS OF WATER MOVEMENTS IN LAKES.
For primary bibliographic entry see Field 2H.
W74-12118

REMOTE CONTROL OF A WATER SYSTEM USING AN ON-LINE MINI COMPUTER,
East Worcestershire Waterworks Co. (England).
R. H. Burch, and K. C. Marlow.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 251-264, 25-27 September 1973. 5 fig, 1 tab.

Descriptors: *Water resources, *Remote control, *Computers, *Water works, *Telemetry, *Monitoring, Operation and maintenance, Communication, Data processing, Regions.
Identifiers: England.

The factors which have created the need for telecontrol in the East Worcestershire Waterworks Company area of 300 square miles are given, together with a summary of the original specification. A detailed description of the system follows and includes the communication system, the configuration of a typical out-station, the form of the central control and the function of the software. The system was commissioned in 1970 and the operational experience that has been gained since then is discussed. The paper concludes with some general observations and a hint of possible future development. (See also W74-12107) (Bell-Cornell)
W74-12121

AN INTRODUCTION TO COMPUTER INFORMATION SYSTEMS IN DISTRIBUTION,
For primary bibliographic entry see Field 4A.
W74-12122

COMPUTERS IN STRUCTURAL DESIGN,
Constructional Industry Research and Information Association, London (England).
For primary bibliographic entry see Field 8A.
W74-12123

USE OF COMPUTERS BY THE CONSULTING ENGINEER IN THE DEVELOPMENT OF WATER RESOURCES,
For primary bibliographic entry see Field 6A.
W74-12124

RECENT DEVELOPMENTS IN COMPUTING SYSTEMS AND REMOTE TERMINALS,
For primary bibliographic entry see Field 6A.
W74-12125

COMPUTER USES IN WATER SYSTEMS: CONTRIBUTED PAPERS.
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 6A.
W74-12126

A CASE STUDY OF THE SUSSEX/KENT RIVER AUTHORITIES' INTEGRATED HYDROMETRIC DATA PROCESSING SYSTEM,
Sussex River Authority (England).
P. F. Drake.
In: Computer Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 1-4, 25-27 September 1973. 1 fig.

Descriptors: Computers, *Data processing, *River basin commissions, *Hydrometry, Water resources development, Water balance, Design, Hydrologic data, Rainfall, Computer programs, River flow, Planning, Management.
Identifiers: Information, *United Kingdom.

The increase in the volume of data and in the complexity of processing and the lack of available suitable staff prompted the Sussex River Authority, in 1968, to consider the use of computers to assist its efficient functioning. The Kent River Authority Engineers Department became a limited liability partner. Work began with a review of the possible areas of application in the technical departments of both Authorities. It became evident that emphasis must be upon water resources rather than on engineering. The approach adopted was to concentrate the Authorities' resources on one area and to insure this being done as thoroughly as possible. Developed was the objective to be able to produce a regular Water Balance sheet for any area on or under the ground. The flow of information necessary for making up a Water Balance is shown diagramatically. Outlined are the design criteria adopted for a proposed family of integrated, free-standing, self-contained computer systems. The first system that was programmed, a Rainfall System, is discussed. Discussed also are organizational developments, the Water Resources Board involvement, and a proposed flow system. (See also W74-12107) (Bell-Cornell)
W74-12127

COMPUTER SERVICES AND APPLICATION IN THE GREATER LONDON COUNCIL'S DEPARTMENT OF PUBLIC HEALTH ENGINEERING,
Greater London Council (England). Dept. of Public Health Engineering.
For primary bibliographic entry see Field 5G.
W74-12129

PROPOSED KIELDER WATER RESERVOIR SCHEME COMPUTER APPLICATION IN YIELD ASSESSMENT,
Northumbrian River Authority (England).
For primary bibliographic entry see Field 4A.
W74-12130

GENERAL ENGINEERING COMPUTER USE AT THE WELLAND AND NENE RIVER AUTHORITY,
Welland and Nene River Authority (England).
For primary bibliographic entry see Field 4A.
W74-12131

THE DESIGN OF A TWO-RESERVOIR RIVER REGULATING SCHEME,
South Staffordshire Waterworks Co. (England).
For primary bibliographic entry see Field 4A.
W74-12132

THE USE OF A COMMERCIAL TIME-SHARING COMPUTER FOR WATER RESOURCE PLANNING,
Severn River Authority (England).
For primary bibliographic entry see Field 6A.
W74-12133

A GENERAL PURPOSE DIGITAL MODEL OF A WATER RESOURCE SYSTEM,
Leicester Univ. (England). Dept. of Engineering.
For primary bibliographic entry see Field 6A.
W74-12135

THE APPLICATION OF A SIMULATION MODEL TO THE PLANNING AND MANAGEMENT OF WATER RESOURCES IN LANCASHIRE,
Lancashire River Authority (England).
For primary bibliographic entry see Field 4B.
W74-12136

COMPUTER ASSISTED QUANTITATIVE SPECTROGRAPHIC ANALYSIS,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 5A.
W74-12137

THE COMPUTER SIMULATION OF THE OPERATION OF A BANK OF RAPID GRAVITY FILTERS,
Water Research Association, Marlow (England).
For primary bibliographic entry see Field 5D.
W74-12141

COMPUTER ORIENTED APPROACH OF A WATER DISTRIBUTION SYSTEM,
National Inst. of Scientific Research, Quebec.
For primary bibliographic entry see Field 4A.
W74-12142

ANALOGUE AND HYBRID METHODS FOR THE ANALYSIS AND PLANNING OF WATER DISTRIBUTION NETWORKS,
Ring-Belt Ltd. (West Germany); and Montan-Forschung (West Germany).
For primary bibliographic entry see Field 4A.
W74-12145

UPPER WABASH SIMULATION MODEL. PROGRAM DOCUMENTATION AND EXTENSION,
Purdue Univ., Lafayette, Ind. Water Resources Research Center.
For primary bibliographic entry see Field 4A.
W74-12197

PROCEDURES FOR FILLING GAPS IN HYDROLOGIC EVENT SERIES,
Pennsylvania State Univ., Harrisburg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-12291

IDENTIFICATION OF PARAMETERS IN AN INHOMOGENEOUS AQUIFER BY USE OF THE MAXIMUM PRINCIPLE OF OPTIMAL CONTROL AND QUASI-LINEARIZATION,
California Univ., Los Angeles. Dept. of Systems Engineering.
For primary bibliographic entry see Field 2F.
W74-12308

DATA FROM CONTROLLED DRILLING PROGRAM IN LEE AND OGLE COUNTIES, ILLINOIS,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 4B.
W74-12317

STREAM FLOW CHARACTERISTICS OF: GREENBRIER RIVER SUB-BASIN,
West Virginia Dept. of Natural Resources, Charleston.
M. S. Baloch, E. N. Henry, and W. H. Dickerson.
June 1969. 95 p, 41 fig, 23 tab.

Descriptors: *West Virginia, *Watersheds(Basins), *River basins, Streamflow, Large watersheds, Floods, Hydrology, Rivers, Runoff, Surface waters, River flow, Low flow, Natural flow, Average flow, Low-flow frequency, Flood recurrence interval, Flow duration, Flow rates, Flow characteristics.
Identifiers: *Greenbrier River Sub-basin(W Va).

Streamflow data in summary form for five gaging stations were presented. Data included extremes of high and low flows, flow durations and estimates for the frequency or return period for given flows. Greenbrier River Basin located in southeastern West Virginia drains 1,656 square miles. The river elevation drops 1,250 ft in a length of 145.7 miles. Annual basin runoff ranges from 10 to 25 inches. The largest runoff occurs in winter and early spring months. (Humphreys-ISWS)
W74-12323

WATER RESOURCES OF WISCONSIN, LAKE SUPERIOR BASIN,
Geological Survey, Washington, D.C.
H. L. Young, and E. L. Skinner.
For sale by USGS, Washington, DC 20242, Price $2.00 per set. Hydrologic Investigations Atlas HA-524, 1974. 3 sheets, 27 fig, 4 tab, 61 ref.

Descriptors: *Water resources, *Wisconsin, Lake Superior, *Hydrologic data, Data collections, Water yield, Groundwater, Surface waters, Water quality, *Maps.
Identifiers: *Lake Superior Basin(Wisc).

Moderate to large quantities of good-quality water are available in much of the Lake Superior basin of Wisconsin, but, in some localities not even small quantities are available. Although groundwater is widespread, more surface water is used. Lake Superior, a vast body of good-quality water, is the main source of surface water. Streamflow is not dependable in some places because of low runoff during drought. Moderate to large flows are available in the St. Louis, White, Nemadji, Bois Brule, and Montreal Rivers. Floods are infrequent, and flood damages are small. Lakes are numerous in some areas of end moraine and outwash. Groundwater is available in moderate to large quantities from two sources: glacial sand and gravel, and sandstones. Both sources can yield more than 500 gpm to wells in some areas, but in a few areas even domestic supplies are difficult to obtain. Small supplies generally can be obtained from lava flows. The quality of both groundwater and surface water generally is good. (Knapp-USGS)
W74-12335

WATER RESOURCES OF WISCONSIN-MENOMINEE-OCONTO-PESHTIGO RIVER BASIN,
Geological Survey, Washington, D.C.
E. L. Oakes, and L. J. Hamilton.
For sale by USGS, Washington, DC 20242, Price $1.75 per set. Hydrologic Investigations Atlas HA-470, 1973. 4 sheets, 25 ref.

Descriptors: *Water resources, *Hydrologic data, *Wisconsin, *Data collections, Basic data collections, Surface waters, Groundwater, Water balance, Surface-groundwater relationships, Water quality, Water utilization.
Identifiers: *Wisconsin River basin(Wis), Menominee River(Wis), Oconto River(Wis), Peshtigo River(Wis).

This 4-sheet hydrologic atlas describes the water resources of the Menominee-Oconto-Peshtigo River basin in Wisconsin. The physical settings, availability, distribution, movement, quality, and use of water are discussed. This atlas is one of a series of 12 river-basin studies designed to describe in general terms the water resources of the State. The basin is bounded by the surface-water divides of the Wisconsin, Wolf, and Fox Rivers, the Wisconsin-Michigan boundary along the Brule and Menominee Rivers, and Lake Michigan (Gree Bay). Large amounts of good quality water are available. The surface water withdrawal in the basin is three times that of groundwater. Ninety-three percent of the surface water used in the basin is for industrial purposes. Non-withdrawal uses of surface water are for power generation, recreation, and wildlife habitat. Groundwater is used for most community, rural, and industrial supplies. Groundwater is available from sand and gravel deposits and sedimentary bedrock. Domestic and stock supplies are availa-

ble everywhere in the basin. The sandstone and sand and gravel aquifers commonly yield more than 500 gpm to wells. Most areas in the basin have adequate supplies of water available for growth and development. Water problems are minor and are related primarily to water quality. Both groundwater and surface water have high hardness; high iron content is a local problem in groundwater. Reaches of some streams are polluted by industrial or municipal wastes. Saline water occurs in the sandstone aquifer near Marinette and locally in the crystalline aquifer. (Knapp-USGS)
W74-12336

DATA ON SELECTED LAKES IN WASHINGTON, PART II,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 5A.
W74-12341

AUTO-QUAL MODELLING SYSTEM,
Environmental Protection Agency, Annapolis, Md. Annapolis Field Office.
For primary bibliographic entry see Field 5B.
W74-12342

FLOOD PLAIN INFORMATION: KINGSLAND CREEK, CHESTERFIELD COUNTY, VIRGINIA,
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-12393

FLOOD PLAIN INFORMATION: OLDTOWN CREEK AND TRIBUTARY, CHESTERFIELD COUNTY, VIRGINIA,
Army Engineers District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-12394

FLOOD PLAIN INFORMATION: MAUMEE AND AUGLAIZE RIVERS, DEFIANCE, OHIO,
Army Engineers District, Detroit, Mich.
For primary bibliographic entry see Field 4A.
W74-12395

SIMULATION OF THE DIFFUSION OF DISSOLVED SALTS IN AQUIFERS,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 5B.
W74-12594

HYDROLOGICAL ANALYSES USING ATMOSPHERIC VAPOR DATA,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 2A.
W74-12596

MAP SHOWING DEPTH TO BEDROCK, HARTFORD SOUTH QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
E. H. Handman, and J. B. Byrnes.
Miscellaneous Field Studies Map MF-487 D, 1974. 1 sheet, 1 map, 3 ref.

Descriptors: *Soil surveys, *Connecticut, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks, *Maps.
Identifiers: Hartford(Conn), *Depth of bedrock.

A map indicates depth of bedrock below land surface in the Hartford South Quadrangle, Connnecticut. The locations of bedrock outcrops were obtained by field mapping and from a surficial geology map. Depths to bedrock are inferred from logs of wells and test holes and excavations for utility lines and foundations supplemented by data from a contour map of the bedrock surface. Depths shown are a generalization of localized high variable conditions and do not include any weathered (decomposed) bedrock. (Knapp-USGS)
W74-12627

CONTOUR MAP OF THE BEDROCK SURFACE, TARIFFVILLE QUADRANGLE, CONNECTICUT-MASSACHUSETTS,
Geological Survey, Hartford, Conn.
E. H. Handman.
Miscellaneous Field Studies Map MF-512 C, 1974. 1 sheet, 1 map, 4 ref.

Descriptors: *Soil surveys, *Connecticut, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks, *Maps.
Identifiers: Tariffville(Conn), *Bedrock surface map.

Contours show the altitude of the bedrock surface in the Tariffville Quadrangle, Connecticut and Massachusetts. The position of the contours is based largely on data from wells, test holes, and published geologic maps supplemented by knowledge of the geologic history of the region. The maps shows the configuration of the bedrock surface if all unconsolidated earth materials were removed. (Knapp-USGS)
W74-12628

MAP SHOWING DEPTH TO BEDROCK, OLD LYME QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
D. B. Meade.
Miscellaneous Field Studies Map MF-558 B, 1974. 1 sheet, 1 map, 5 ref.

Descriptors: *Soil surveys, *Connecticut, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks, *Map.
Identifiers: Old Lyme(Conn), *Depth to bedrock.

A map indicates depth to bedrock (ledge) below land surface in the Old Lyme Quandrangle, Connecticut. The locations of bedrock outcrops were obtained from a bedrock geology map and unpublished surficial geology maps. Depths to bedrock are inferred from logs of wells and test holes and data from continuous seismic profiles under the Connecticut River supplemented by data from the contour map of the bedrock surface. Depths shown are a generalization of localized high variable conditions and do not include any weathered (decomposed) bedrock. (Knapp-USGS)
W74-12629

CONTOUR MAP OF THE BEDROCK SURFACE, GLASTONBURY QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
R. B. Ryder, and E. H. Handman.
Miscellaneous Field Studies Map MF-561 B, 1974. 1 sheet, 1 map, 2 ref.

Descriptors: *Soil surveys, *Connecticut, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks, *Maps.
Identifiers: Glastonbury(Conn), Bedrock surface map.

Contours show the altitude of the bedrock surface in the Glastonbury Quadrangle, Connecticut. The position of the contours is based largely on data from wells and test holes and a bedrock map supplemented by knowledge of the geologic history of the region. The map shows the configuration of the bedrock surface if all unconsolidated earth materials were removed. (Knapp-USGS)
W74-12630

CONTOUR MAP OF THE BEDROCK SURFACE, ELLINGTON QUADRANGLE, CONNECTICUT,
Geological Survey, Hartford, Conn.
E. H. Handman, and R. B. Ryder.
Geological Survey Miscellaneous Field Studies Map MF-604 A, 1974. 1 sheet, 1 map, 3 ref.

Descriptors: *Soil surveys, *Connecticut, *Geologic mapping, *Bedrock, Geologic investigations, Overburden, Soils, Sediments, Rocks, *Maps.
Identifiers: Ellington(Conn), *Bedrock surface map.

Contours show the altitude of the bedrock surface in the Ellington Quadrangle, Connecticut. The position of the contours is based largely on data from wells and test holes, a surficial geology map, and a bedrock geology map supplemented by knowledge of the geologic history of the region. The map shows the configuration of the bedrock surface if all unconsolidated earth materials were removed. (Knapp-USGS)
W74-12631

MAP SHOWING AVAILABILITY OF GROUNDWATER, WARREN QUADRANGLE, MASSACHUSETTS,
Geological Survey, Boston, Mass.
C. J. Londquist.
Miscellaneous Field Studies Map MF-541 E, 1974. 1 sheet, 1 map, 4 ref.

Descriptors: *Groundwater, *Water yield, *Massachusetts, Hydrogeology, Aquifer characteristics, *Maps, Water wells.
Identifiers: Warren(Mass).

Availability of water from unconsolidated deposits in the Warren Quadrangle, Connecticut is shown by a map. Areas in which most properly developed individual wells can be expected to yield less than 25 gpm have deposits including till, very fine sand, silt, and clay with a variable water-saturated thickness as well as sand, gravel, and interbedded sand and gravel with a water-saturated thickness of 10 feet or less. Areas in which most properly developed individual wells can be expected to yield more than 25 gpm have deposits including fine to very coarse sand, gravel, and interbedded sand and gravel with a water-saturated thickness of greater than 10 feet. Unconsolidated deposits are everywhere underlain by crystalline bedrock. Properly developed individual bedrock wells generally yield less than 20 gpm. (Knapp-USGS)
W74-12632

MAP SHOWING DRAINAGE AREAS, WARREN QUADRANGLE, MASSACHUSETTS,
Geological Survey, Boston, Mass.
C. J. Londquist.
Miscellaneous Field Studies Map MF-541 F. 1974. 1 sheet, 1 map.

Descriptors: *Streams, *Watersheds(Basins), *Drainage area, *Massachusetts, River basins, River systems, Surface waters, Watersheds(Divides).
Identifiers: Warren(Mass).

A map shows stream systems and drainage areas that contribute streamflow to selected sites on streams in the Warren Quadrangle, Connecticut. Drainage areas shown have not been adjusted for the manmade changes in the natural regimens such as storm sewers, diversion dams, canals, and tunnels. (Knapp-USGS)
W74-12633

APPLICATION OF ERTS-1 DATA TO THE PROTECTION AND MANAGEMENT OF NEW JERSEY'S COASTAL ENVIRONMENT,
Earth Satellite Corp., Washington, D.C.
For primary bibliographic entry see Field 2L.
W74-12639

HYDRAULIC CONSTANTS OF TIDAL ENTRANCES 1: DATA FROM NOS TIDE TABLES, CURRENT TABLES AND NAVIGATION CHARTS,
Florida Univ., Gainesville. Coll. of Engineering.
For primary bibliographic entry see Field 2L.
W74-12648

HYDROLOGIC DATA FOR URBAN STUDIES IN THE AUSTIN, TEXAS METROPOLITAN AREA, 1972,
Geological Survey, Austin, Tex.
E. E. Wehmeyer.
Open-file report, June 1974. 49 p, 3 fig, 1 tab.

Descriptors: *Urban hydrology, *Texas, *Basic data collections, *Rainfall-runoff relationships, Hydrologic data, Rainfall, Streamflow, Urbanization, Storm runoff.
Identifiers: *Austin(Tex).

Hydrologic studies in the Austin urban area, Texas are made to determine the effects of progressive urbanization on infiltration, rates of peak discharge, and rainfall-runoff relations in the Waller Creek watershed. Rainfall and runoff data from the rural Wilbarger Creek watershed are used for comparative purposes in determining the effects of existing and progressive urbanization in the Waller Creek watershed. Rainfall and runoff data are presented for the Waller Creek and Wilbarger Creek study areas for the 1972 water year (October 1, 1971 to September 30, 1972). (Knapp-USGS)
W74-12653

RECENT DEVELOPMENTS IN PREPARING COLORED AGROCLIMATIC MAPS BY COMPUTER,
Department of Agriculture, Ottawa (Ontario).
W. Baier, W. R. Sharp, and J. G. Roberts.
Can J Soil Sci, Vol 53, No 1, p 133-134. 1973.
Identifiers: *Agroclimatic maps, *Computer mapping, *Maps, Seasonal, Soils, Publications.

Digitizing and plotting techniques were improved and combined with standard cartographic and photomechanical procedures to produce waterproofs for checking and negatives suitable for plating and printing for full color publication. These neelopments are described, and a full color sample map prepared from derived data of seasonal water deficits is presented. The computer mapping technique reduced tedious cartographic work usually necessary for the preparation of maps for publication. Besides the time-saving aspect in the preparation of maps for publication, the digitizing of working maps has the additional advantage that the data are on magnetic tapes and therefore available for combination with information from other data banks such as those for soils and plant distribution.--Copyright 1974, Biological Abstracts, Inc.
W74-12695

8. ENGINEERING WORKS

8A. Structures

WHAT'S NEW IN WATER AND SEWER PIPE,
K. A. Godfrey, Jr.
Civil Engineering-ASCE, (American Society of Civil Engineers), Vol 44, No 5, p 72-73, May 1974. 1 fig.

Descriptors: *Tunnel linings, *Sewers, *Steel pipes, *Construction materials, Channels, Concrete, *New York.
Identifiers: *Staten Island(NY), Steel tunnels, Steel channels, Neoprene gaskets.

For a savings of time and money, steel channels were used to line a tunnel for a ten foot OD sanitary sewer in Staten Island, New York. The steel tunnel lining was designed to carry permanent loading, permitting the contractor to hole the tunnel before placing the cast-in-place concrete liner. Wide steel channels (24 inches) were made and welded flange to flange, then pressed to conform to the tunnel shape. The length of the job is 17,000 feet, and is characterized by having a wide segment width of 48 inches to ensure rapid tunneling, and being the first major tunnel in New York City using neoprene gaskets which are factory applied. (Murphy-FIRL)
W74-12007

FIELD AND MODEL STUDIES ON A SILTATION PROBLEM IN THE FRASER RIVER,
Department of Public Works, Vancouver (British Columbia).
E. O. Isfeld, D. Hay, and J. Rossouw.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 44-63, 1973. 7 fig, 3 ref.

Descriptors: *River training, *Sediment control, *Suspended load, Bypasses, Groins(Structures), Flow control, Model studies, Hydraulic models, *Canada.
Identifiers: *Fraser River(Canada).

A siltation problem developed behind a training wall in the Fraser River at New Westminster, Canada. Field and model studies were undertaken to examine remedial measures. The field studies included detailed measurements of suspended load and directional velocity profiles across various sections of the river in the area of the training wall. The model study consisted of two stages. In the first stage, the model bed was fixed and mainly suspended load was studied. In the second stage a movable bed was used and the bedload was studied. Secondary flow developing in the river bend caused flow close to the bed to move towards the left bank, resulting in the high sediment concentration in this area. The water passing over the upstream opening in the training wall was thus heavily loaded with suspended sediment. Due to an increase in width of flow behind the training wall, the influence of the opening extended into the river drawing a higher percentage of flow than the ratio of cross-sectional areas. The widening also resulted in a decrease in flow velocities behind the wall with subsequent settling of suspended material. A remedial measure which permitted some flow through the opening and access for navigation required this secondary flow to be reversed near the opening. The obvious solution was to test groins upstream of the opening which would effect a local reversal in the curvature of the flow. Various schemes were tested in which a groin situated 500 feet upstream of the upstream weir opening in the training wall was varied in length. A large increase in efficiency against sedimentation occurred with increasing groin length up to a length of approximately 370 feet. (See also W74-12087) (Knapp-USGS)
W74-12089

COMPUTERS IN STRUCTURAL DESIGN,
Constructional Industry Research and Information Association, London (England).
L. S. Blake.
In: Computer Uses in Water Systems: Conference Papers, A Water Research Association Conference, University of Reading, England, p 275-281, 25-27 September 1973. 5 ref.

Descriptors: Computers, *Structural design, *Analytical techniques, *Computer programs, *Optimization, Water resources, Projects, Systems analysis.
Identifiers: *Detailing.

The background to the involvement of computers in structural design is discussed briefly together with the comparatively recent application to the potentially more profitable area of detailing. The problems facing the structural designer are used to establish the context in which computer design is applied. Outlined are the development of analytical methods and the results of a number of projects in which such methods have been subjected to experimental verification. The area of optimization in design is investigated and references are made to particular optimizing models. Design aids, such as the LUCID system, which are distinct from optimizing programs are discussed, and the paper concludes with a prediction as to the direction in which the whole area could reasonably be expected to develop during the next ten years. (See also W74-12107) (Bell-Cornell)
W74-12123

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA, VOLUME 1, REPORT,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
E. R. Dodge.
Available from NTIS, Springfield, Va 22161 as PB-220 093, Price $3.00 printed copy; $2.25 microfiche. Final Report to Montana Department of Highways, Helena, Planning and Research Bureau, September 15, 1972. 105 p.

Descriptors: *Design flow, *Design flood, *Frequency analysis, *Montana, *Culverts, Highways, Roads, Design data, Hydraulic structures, Flood recurrence interval, Synthetic hydrology.

A regional streamflow frequency analysis was performed, involving both natural and synthetic streamflow records, to estimate flood magnitude of various recurrence intervals for each of 230 Montana watersheds. Using regression analysis, flood peak prediction equations for the 2-, 5-, 10-, 25- and 50-year recurrence intervals were developed fr each of 9 contiguous geographic regions in Montana. These equations predict the flood peak as the product of powers of various hydrologic watershed parameters. A detailed discussion of the hydraulic conditions which occur for various types of culvert flow is presented along with modern criteria and methods for culvert selection. (Knapp-USGS)
W74-12340

DEEPWATER PORTS.
For primary bibliographic entry see Field 6E.
W74-12619

SAVANNAH MUCK DIKES--RESTORATION FEASIBILITY STUDY.
Weaver Enterprises, Waterloo, N.Y.
Available from NTIS, Springfield, Va 22161 as PB-220 934, Price $5.50 printed copy; $2.25 microfiche. Final Report to Wayne County Planning Board, February 1973. 18 p, 13 fig. HUD Contract CPA-NY-02-36-1001.

Descriptors: *Flood control, *New York, *Muck soils, *Dikes, Hurricanes, Floods, Flood protection, *Feasibility studies, Cities.
Identifiers: *Savannah(NY).

The mucklands in the Savannah, N. Y. area were inundated and partially destroyed by the floods which followed Hurricane Agnes in June 1972. This feasibility study was set up to determine the economic feasibility of restoring the mucklands to production. (Knapp-USGS)
W74-12638

8B. Hydraulics

FIRST CANADIAN HYDRAULICS CONFERENCE PROCEEDINGS.
Alberta Univ., Edmonton. Dept. of Civil Engineering.
Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, 1973. 672 p.

Descriptors: *Hydraulics, *Conferences, *Canada, Streamflow, Rainfall-runoff relationships, Open channel flow, Groundwater movement, Mathematical models, Simulation analysis.

The Canadian Hydraulics Conference provides a forum for the exchange of ideas among Canadian hydraulic engineers. The first conference, in 1973, was attended by 165 registered participants. The topics discussed in the first conference were river engineering, hydraulic aspects of pollution, numerical models, and structures. (See W74-12088 thru W74-12106) (Knapp-USGS)
W74-12087

BACKWATER EFFECTS AT END-DUMPED CONSTRICTIONS ON ALLUVIAL CHANNELS,
Directorate of Designs, Irrigation, Bhubaneswar (India).
B. P. Das, and J. B. Nuttall.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 30-43, 1973. 7 fig, 11 ref. NRC Grant A4334.

Descriptors: *Backwater, *Alluvial channels, *Open channel flow, Flow around objects, Scour, Froude number, Deflection, Abutments, Canada.
Identifiers: *Channel constrictions.

The most common method of restricting a river channel is by end-dumping fill material from one or both banks. Backwater rise due to a dumped constriction depends on the Froude number of the undisturbed flow and the shape of the constriction. Constriction shape in turn depends on interaction between the bed, the dumped material and the flow and on the method of placement. The backwater rise for end-dumped constrictions at equilibrium scour depends on material and flow properties. A 7.5-foot-wide flume, 60 feet long, with a maximum flow of 3 cfs was used for tests. Bed material 1.5 feet thick was placed over a length of 50 feet. Tests were run at three Froude numbers, 0.50, 0.29, and 0.10. The corresponding uncontracted normal depths were 0.18, 0.26, and 0.38 feet, respectively. With these depths the maximum scour was limited to 1.5 feet, the depth of the bed. Maximum backwater rise on an alluvial bed is much less than for a rigid bed. The effect of bed material size is of relatively little significance. (See also W74-12087) (Knapp-USGS)
W74-12088

FIELD AND MODEL STUDIES ON A SILTATION PROBLEM IN THE FRASER RIVER,
Department of Public Works, Vancouver (British Columbia).
For primary bibliographic entry see Field 8A.
W74-12089

FLOOD PLAIN STUDIES IN ONTARIO,
Dillon (M. M.), Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 6F.
W74-12090

FLOW CHARACTERISTICS OF THE OUTLET CHANNELS OF LAKE WINNIPEG FOR NATURAL AND REGULATED CONDITIONS,
Manitoba Hydro.
D. J. Phelps, and R. W. Coley.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 77-95, 1973. 9 fig, 12 ref.

Descriptors: *Discharge measurement, *Flow characteristics, *Lakes, *Open channel flow, Regulated flow, *Canada, Outlets, Regulation, Stage-discharge relations, Flow measurement, Gaging stations.
Identifiers: *Lake Winnipeg(Canada).

The method utilized by Manitoba Hydro to analyze the Nelson River flows through the outlet channels of Lake Winnipeg is described. Lake Winnipeg outflow relationships were developed for natural and for improved and controlled conditions. Flow distribution and water surface profiles were computer through an intricate chain of natural channels controlled by a series of rapids and falls, mildly sloping lakes, and excavated channels, for both open water and ice conditions. Hydrometric surveys, simulation of rapids and falls (natural weirs), and determination of channel bed and ice roughness are described. Analytical flow charts are included. (See also W74-12087) (Knapp-USGS)
W74-12091

RESISTANCE TO FLOW IN ICE COVERED RIVERS--A SIMULATION STUDY WITH ARTIFICIAL ROUGHNESS,
New Brunswick Univ., Fredericton.
K. S. Davar, and E. S. M. A. Ismail.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 107-128, 1973. 11 fig, 1 tab, 16 ref.

Descriptors: *Streamflow, *Ice cover, *Closed conduit flow, *Flow resistance, Roughness(Hydraulic), Hydraulics, Hydraulic models, Model studies.
Identifiers: Ice-covered rivers.

Resistance to flow under ice was studied in a rectangular conduit with relatively large roughness elements at the top, of various sizes and spacings, as may occur in an ice covered channel. The measured velocity profiles did not conform to the normal logarithmic velocity profiles for turbulent flow. (See also W74-12087) (Knapp-USGS)
W74-12092

PREDICTING DEPTH-DISCHARGE RELATIONSHIPS FOR SAND-BED RIVERS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-12093

LABORATORY STUDY OF SCOUR AT CHANNEL BENDS,
Research Council of Alberta, Edmonton.
B. A. Nwachukwu.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 144-164, 1973. 7 fig, 2 photo, 3 tab, 14 ref.

Descriptors: *Scour, *Meanders, *Alluvial channels, Sediment transport, Stream erosion, Vortices, Turbulent flow, Hydraulic models, Flumes.

To define the location of maximum depth of scour in channel bends, laboratory tests were conducted to find the relationship between maximum depth of scour, bend geometry and flow variables. The bed material consisted of sand having a median sieve diameter of 0.35 mm. Graphs are presented showing the variation of the ratios of maximum to mean depth with deflection angle, curvature ratio, depth/width ratio and Froude number. Besides the curvature it was found that flow condition and deflection angle could be significant parameters affecting the maximum depth at bends. (See also W74-12087) (Knapp-USGS)
W74-12094

HYDRAULIC INFLUENCES ON AUFEIS GROWTH,
For primary bibliographic entry see Field 2C.
W74-12095

INTERFACILA SHEAR STRESS IN DENSITY WEDGES,
Canada Centre for Inland Waters, Burlington (Ontario).
T. M. Dick, and J. Marsalek.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 176-191, 1973. 3 fig, 1 tab, 2 ref.

Descriptors: *Stratified flow, *Density stratification, *Shear stress, *Saline water-freshwater interfaces, Saline water intrusion, Path of pollutants, Mixing.
Identifiers: *Density wedges.

When a fluid flows into another fluid of different density, stratification may occur and a distinct interface may be formed. As the interface is usually sloping the phenomenon is often called a density wedge. Various methods for the estimation of the interfacial shear stress coefficient in density wedges were examined to determine the significant parameters and the best method for computing the coefficient for practical purposes. An interim procedure is suggested which gives consistent results over a wide range of Reynolds numbers and different wedge types. The interfacial shear stress may be estimated from the Moody diagram for pipe flow by taking the hydraulic values as the new depth of the bottom layer and assumes the relative roughness as 'smooth'. (See also W74-12087) (Knapp-USGS)
W74-12096

CIRCULAR TURBULENT JET IN AN OPPOSING INFINITE STREAM,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-12097

LATERAL MIXING CHARACTERISTICS OF THE HYDRAULIC JUMP IN A SPATIALLY-VARIED FLOW,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-12098

REAERATION IN OPEN-CHANNEL FLOW,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5G.
W74-12099

APPLICATION OF THE CONCEPT OF BIFURCATED PLUME TO SOME OIL POLLUTION PROBLEMS IN THE STRAIT OF GEORGIA,
Alberta Univ., Edmonton. Inst. of Earth and Planetary Physics.
For primary bibliographic entry see Field 5B.
W74-12100

NUMERICAL MODEL STUDIES OF RIVERS AND ESTUARIES,
National Research Council of Canada, Ottawa (Ontario). Hydraulics Lab.
N. Crookshank.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p315-336, 1973. 7 fig, 3 ref.

Descriptors: *Numerical analysis, *Finite element analysis, *Rivers, *Estuaries, *Mathematical models, Model studies, Canada, Streamflow, Path of pollutants, Design.

Numerical hydrodynamic modeling of rivers and estuaries in one and two dimensions is reviewed. The accuracy is considered sufficient for most engineering purposes. Applications to the St. Lawrence, Fraser and St. Clair Rivers are discussed. The formulation of a model involves the representation or schematization of the physical geomorphology by discrete sections. Rivers may be represented by lengthwise sections in one dimension while wide estuaries are better represented by a rectangular grid in two dimensions. The physical equations which describe the flow are then solved for finite increments both in time and space by numerical methods that are efficient and economical. (See also W74-12087) (Knapp-USGS)
W74-12101

CONTROL OF SEA WATER INTRUSION BY SALTWATER PUMPING--A MATHEMATICAL MODEL,
MacLaren (James F.) Willowdale (Ontario).
For primary bibliographic entry see Field 5G.
W74-12102

A NUMERICAL MODEL FOR FLOW PAST A SPUR-DIKE,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
N. Zaghloul, and J. A. McCorquodale.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University water Resources Center Publication No 4, p 355-368, 1973. 10 fig, 8 ref.

Descriptors: *Scour, *Mathematical models, *Groins(Structures), Flow around objects, Numerical analysis, Stream erosion, Hydraulic structures, Jetties, Flow control, River training.
Identifiers: *Spur dikes.

A mathematical model simulates the scour around spur dikes. Initially a two-dimensional numerical model is used for the flow pattern around a 'sheet' pile dike, utilizing the Reynolds equations with a constant eddy viscosoty. The Reynolds equations are transformed into a Helmholtz vorticity equation and a Poisson type equation. These two equations are solved alternately, by a finite difference technique, to obtain the variations in vorticity and stream function with time. After the flow pattern has become relatively steady, the bed is allowed to erode and the stream function is redefined in terms of a depth averaged velocity. A bed shear function is computed from the local velocity, turbulence and vorticity. Finally, the difference between the local shear and local bed resistance is reduced to zero by adjusting the local depth. (See also W74-12087) (Knapp-USGS)
W74-12103

NUMERICAL ANALYSIS OF GROUNDWATER FLOWS,
FENCO, Toronto (Ontario).
For primary bibliographic entry see Field 4B.
W74-12104

WATERSHED MODELLING USING A SQUARE GRID TECHNIQUE,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-12105

A COMPUTER SIMULATION OF THE MOTION OF A SOLID PARTICLE IN A TURBULENT FLOW WITH FREE SURFACE,
Canada Centre for Inland Waters, Burlington (Ontario).
B. G. Krishnappan.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 435-450, 1973. 5 fig, 10 ref.

Descriptors: *Sediment transport, *Turbulent flow, *Open channel flow, *Simulation analysis, Suspended load, Settling velocity, Turbulence.

The random motion of a solid particle in a two-dimensional and uniform turbulent flow in open channels was simulated using a computer. The simulation is based on the hypothesis that the solid particles are dispersed, essentially in the same manner as 'fluid lumps' except that the solid particles continuously sink relative to fluid lumps. A normal function (Gaussian curve) was used as the probability density distribution for the random vertical position of the particle at any instant. (See also W74-12087) (Knapp-USGS)
W74-12106

COMPUTER AIDED ECONOMIC DESIGN OF WATER DISTRIBUTION SYSTEM,
University Coll., London (England). Dept. of Civil Engineering.
A. K. Deb.
In: Compueter Uses in Water Systems: Contributed Papers. A Water Research Association Conference, University of Reading, England, p 75-78, 25-27 September 1973. 4 equ, 4 ref.

Descriptors: *Water distribution(Applied), *Networks, *Design, *Pipes, Hydraulics, *Optimization, *Economics, Water supply, Valves, Pressure head, Pumping Reservoir storage, Hazen-Williams equation, Pipe flow, Digital computers, Systems analysis, Mathematical models.
Identifiers: *Cost minimization.

The complexity of deriving the optimum cost solution for a water distribution system is explained. Considering the initial costs of pipes, pumps and elevated service reservoir, and maintenance and power cost, a method to obtained optimum pressure surface, inlet hydraulic head and position of the service reservoir has been proposed. The method of analysis gives the workable minimum cost pipe sizes of a network of given inflows, outflows and hydraulic pressure surface over the network. A pipe network system solved to illustrate the validity of the approach is discussed. Results showed a 33% saving in cost when the elevated reservoir was located at the center of the network. The effect of population density on cost saving is mentioned. A high speed digital computer is necessary in order to use this optimization method for least cost solution of a water distribution network. (See also W74-12107) (Bell-Cornell)
W74-12140

TRANSVERSE MIXING IN AN ICE-COVERED RIVER,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-12293

ADJUSTMENT OF RIVER CHANNEL CAPACITY DOWNSTREAM FROM A RESERVOIR,
Exeter Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 4A.
W74-12298

PIPE FLOW MODELS OF A KENTUCKY LIMESTONE AQUIFER,
Kentucky Univ., Lexington. Dept. of Geology.
For primary bibliographic entry see Field 2F.
W74-12326

MEASUREMENTS OF SAND TRANSPORT BY WIND ON A NATURAL BEACH,
For primary bibliographic entry see Field 2L.
W74-12334

APPLICATION HYDROLOGIC AND HYDRAULIC RESEARCH TO CULVERT SELECTION IN MONTANA, VOLUME 1, REPORT,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 8A.
W74-12340

ANNULUS-LOSS ESTIMATES CAN BE MORE PRECISE,
For primary bibliographic entry see Field 8C.
W74-12534

PROBLEMS ENCOUNTERED IN DRILLING AND COMPLETING DEEP WELLS,
B. A. Eaton.
Society of Petroleum Engineers of AIME Preprint SPE 3662, 1971. 8 p, 10 fig, 1 tab, 15 ref.

Descriptors: *Drilling, *Deep wells, Exploration, Oil industry, Oil wells, Gasses, Statistics, Planning, Pore pressure, Data collection, Boreholes, Mud, Cement, Temperatures.
Identifiers: *Exploration wells, Surface hole, Intermediate hole, Hole below intermediate casing, Fracture pressure curves, Rigs, Wildcat well drilling.

Problems encountered in drilling and completing wells to 15,000 feet and below are reviewed. Statistical trends in deep well drilling indicate that increasing numbers of such wells will be drilled each year. Problems associated with this activity are similar to those of past shallow drilling. However, these problems are more severe and much more expensive than those in the past. The role of a drilling coordinator, with regard to the development of sound, workable drilling plans, is discussed. A method of well planning is presented that, if used, will reduce the frequency of expensive problems in deep drilling. One problem involves the attempted completion of wells drilled below depths where commercial production is extremely unlikely to be found. A means of avoiding this problem is also discussed. A great majority of drilling and completion problems could be eliminated by better planning, and better trained on-site rig supervisors carrying out previously agreed upon well plans. (Campbell-NWWA)
W74-12540

FACTORS AFFECTING DESIGN, DEVELOPMENT AND COST OF WELLS,
Universal Oil Products, St. Paul, Minn. Johnson Div.
J. L. Mogg.
Johnson Drillers Journal, p 1-3, May-June, 1973. 1 tab.

Descriptors: Aquifer characteristics, Test wells, *Groundwater, Drilling, Pumping, Testing, Water wells, Sampling, Specific capacity, Well data, Screens, Casings, Costs, Drawdown, Cost analysis, Drillers logs, Drilling equipment.
Identifiers: *Mini-well, Pilot hole, High-velocity horizontal-jetting tool.

Modern practices of well design permit designers to follow clearly understood, orderly and relatively simple steps to design a successful well with confidence. These steps can be stated as follows: Drilling a pilot hole (4-6 inches in diameter) and often converting the pilot hole into a Mini-Well. From the pilot or test hole, as it is sometimes called, the location, thickness, and character of the aquifer (or aquifers) is obtained. Using inexpensive geophysical equipment, the driller's log can be verified with either an electric or gamma-ray log. Portable, easily operated equipment for making either type of log can be purchased for less than $2,500, consequently the cost of making the log is small. The results of pumping the Mini-Well provides specific capacity data that used in conjunction with the geometry of well and aquifer permits an accurate prediction of the maximum yield of a large capacity well constructed at the site. (Campbell-NWWA)
W74-12541

PORE-VOLUME COMPRESSIBILITY OF CONSOLIDATED, FRIABLE, AND UNCONSOLIDATED RESERVOIR ROCKS UNDER HYDROSTATIC LOADING,
Chevron Oil Field Research Co., Richmond, Calif.
For primary bibliographic entry see Field 8E.
W74-12542

THE COST OF GEOPHYSICAL EXPLORATION.
Water Well Journal, Vol 28, No 8, p 44-46, August, 1974. 2 fig.

Descriptors: *Bore hole geophysics, Logging(Recording), Electrical well logging, Exploration, *Costs, *Groundwater, Rural areas, Drilling, Drillers logs, Electrical resistivity, Instrumentation, *Exploration.
Identifiers: *Geophysical exploration, National Demonstration Water Project, Rural water, Groundwater development, Geophysical methods.

The value of geophysics in groundwater exploration and development has been profoundly demonstrated. Unfortunately, the cost of using geophysical techniques has usually been quite high. Thus geophysical aids to groundwater development have mainly been restricted to large budget projects where its use could be economically justified. This situation has been unfortunate in that many smaller, low budget projects, especially those requiring maximum economic efficiency, could greatly benefit from geophysical techniques. Within recent years, however, advances in solid-state electronics have made possible the development of low cost, portable geophysical instruments. Many of these instruments were designed specifically for use in groundwater exploration and development. Their use permits smaller projects to enjoy the benefits of geophysical techniques. One such small project was a National Demonstration Water Project near Logan, West Virginia. Geophysical techniques do not guarantee success, but rather serve to locate the site(s) in a given area that offer the most potential for ground water development. The value of the geophysical methods employed was demonstrated. The collection of additional subsurface information aids in the development of a ground water supply, especially for small water systems in which an expensive and laborious test well drilling program is neither economically possible nor practical. (Campbell-NWWA)
W74-12544

8C. Hydraulic Machinery

A STUDY OF SELECTED COOLING POND DESIGN TECHNIQUES,
South Carolina Univ., Columbia. Coll. of Engineering.
For primary bibliographic entry see Field 5D.
W74-12015

WATER SYSTEM OPERATOR NEEDS BASIC INFORMATION TO KEEP PUMPS WORKING, PART II,
Johnson Drillers Journal, p 2-4, May-June 1974. 5 fig, 1 tab.

Descriptors: Water wells, *Groundwater, Specific capacity, Water supply, *Well data, Water works, *Hydraulic structures, Equipment, Turbines, Pump turbines, Pumps, Pressure, Pressure head, Drawdown, Water pollution, Head, Head loss, Centrifugal pumps, *Operations.
Identifiers: *Community water systems, *Water system operators, Well performance, Records, Head-capacity curve, Dynamic head, Contamination.

About 80 million people in the United States are served by community water systems that draw upon groundwater sources. In addition, it is estimated that individual wells supply water to 30 million more persons. Water from good wells, particularly those tapping waterbearing sand formations, is usually of high bacteriological quality, but contamination can occur after delivery into the distribution system. A water well loses capacity slowly over a period of months or years. Usually, there is ample time to detect any deterioration and to plan corrective measures. The operator can select the best time to do the work during the season, day or time of day when there will be the least effect on service to the customer. To accomplish this, it is essential to have records that show trends in well and aquifer performance. The water system operator can use the history to diagnose the cause of a problem or to predict the probable occurrence of a problem. The owner of a system, and his customers, stands to benefit from accurate diagnoses. Benefits accrue in dollars saved and in service rendered. Some signs of water well trouble which the operator should watch for are changes in specific capacity and changes in turbine pump output. (See also W74-10103) (Campbell-NWWA)
W74-12526

MEASURING AND USING ROTARY DRILLING TORQUE,
Texaco Research Lab., Bellaire, Tex.
H. A. Rundell.
Oil and Gas Journal, Vol 71, No 20, p 76, 81-82, May 14, 1973. 4 fig, 1 ref.

Descriptors: *Rotary drilling, *Oil industry, Measurement, Drilling, Pipes, Penetration, Gears.
Identifiers: Torque, Bits, *Torquemeter, Rigs, Rotary speed, U.S. patents.

Recordings of torque and rotary speed from the torquemeter can provide valuable information on the degree of wear of the rotary bit during the course of the bit run, and reliable indications of impending bearing failure. More recently, a modification of the torquemeter has been developed. It allows its use on chain-driven rotaries as well. The Texaco torquemeter measures absolute torque by measuring the angular deflection of a portion of the rotary-drive section. The torquemeter is virtually maintenance-free, and has proven extremely durable over several years' use. Torque measurement accuracy is at least 2% of full scale (usually set at 50,000-ft-lb). Greater sensitivity is possible by setting full scale at 25,000-lb-ft. In addition to its immediate utility, the Texaco torquemeter provides a feedback of formation-bit interaction. This may supply the element necessary to allow computer-controlled minimum-cost drilling to become a practical reality. The Texaco torquemeter is covered by pending and issued U.S. patents. (Campbell-NWWA)
W74-12527

INDUCED INFILTRATION AT THE UNIVERSITY OF CONNECTICUT WELL FIELD,
Connecticut Univ., Storrs.
For primary bibliographic entry see Field 4B.
W74-12529

CAN FREEZING IMPROVE WELLS IN CONSOLIDATED ROCK AQUIFERS,
Food and Agriculture Organization of the United Nations, Rome (Italy). Land and Water Development Div.
For primary bibliographic entry see Field 4B.
W74-12532

USE OF ORGANIC POLYMER DRILLING FLUID IMPROVES CORE DRILL EFFICIENCY.
For primary bibliographic entry see Field 8G.
W74-12533

ANNULUS-LOSS ESTIMATES CAN BE MORE PRECISE,
P. L. Moore.
Oil and Gas Journal, Vol 71, No 33, p 111-113, August 13, 1973. 2 fig, 2 tab.

Descriptors: Pressure, *Drilling, Circulation, Mud, Drilling fluids, *Groundwater, Drilling equipment, Wells, Coredrilling, Drill holes, Rotary drilling, Pipes, Flow, Equations, Oil industry.
Identifiers: *Annulus loss, *Drill string losses, Standpipe pressures, Surge pressures, Drill collars, Flow patterns, Down-hole measurements.

Annulus pressure loss in a drill string may be determined by reading standpipe pressure directly and subtracting the calculated pressure losses inside drill string and bit. The advantages of this procedure are: (1) The inside measurements of the drill string are more precise than hole-size estimates. (2) Pressure losses through the bit are considered very accurate. (3) Flow patterns inside the drill string and through the bit are generally turbulent, and viscous flow properties have a minor effect on the total pressure loss in this part of the string. (4) Flow patterns in the annulus are generally laminar, and viscous flow properties of the mud affect pressure losses substantially. Disadvantages of using the procedure are: (1) Most of the pressure loss in the circulating system occurs inside the drill string and through the bit. So a 5% error in these calculations would result in a potential 30 to 40% error in determination of total annular pressure losses. (2) The procedure is limited to a determination of total annular pressure losses, and the point of interest is very often just below the last casing seat to the surface, not from total depth to the surface. Accuracy of annulus pressure-loss equations is limited because the flow properties of the mud must be measured at a given surface temperature. And these measurements are used in the equations. (Campbell-NWWA)
W74-12534

HIGH-PRESSURE DRILLING,
W. C. Maurer, J. K. Heilhecker, and W. W. Love.
Journal of Petroleum Technology, Vol 25, No 7, p 851-859, July, 1973. 18 fig, 2 tab, 15 ref.

Descriptors: *Drilling, Data, Oil wells, Laboratory tests, High pressure, Sedimentary rocks, On-site tests, Economics, *Oil industry, *Texas.
Identifiers: *Novel drills, Lasers, Electron beams, Erosion bits, High-pressure roller bit tests, Rigs, High-pressure triplex pump.

A survey has been made of more than 25 novel drills, and drilling rates were predicted for each of these drills in oil wells on the basis of available laboratory drilling data. Novel drills that thermally spall rock were found to have limited potential for drilling oil wells because most sedimentary rocks will not spall. Devices such as lasers and electron beams had extrapolated drilling rates of less than 1 foot/hour because of the high energy requirement for fusing rock. Research was begun to further evaluate high-pressure bits for oil-well drilling. The following conclusions were reached: (1) A threshold nozzle pressure must be exceeded before high-pressure bits will erode rock rapidly. (2) Conventional triplex mud pumps can be equipped with high-pressure fluid ends to provide low-cost,

reliable, high-pressure pumps. (3) A 2-inch diameter erosion drill operating at pressures up to 13,500 psi drilled Carthage marble at 180 feet/hour, Indiana limestone at 280 feet/hour, and Berea sandstone at 320 feet/hour. (4) Full-scale high-pressure roller bits operating at pressures of 10,000 to 15,000 psi can drill most rocks two to three times faster than conventional roller bits. (5) High-pressure bits have a potential for producing significant savings in drilling costs, especially in high-cost areas such as deep land wells, offshore wells, or arctic wells. (Campbell-NWWA)
W74-12537

THE APPLICATIONS AND LIMITATIONS OF DEEP DRILL STEM TESTING,
P. J. Zecchi, and B. J. Scott.
Society of Petroleum Engineers of AIME Preprint SPE 3907, 1972. 9 p, 8 fig, 3 tab, 10 ref, append.

Descriptors: Planning, *Deep wells, Boreholes, *Test wells, Mud, Geologic formations, Equipment, Data, Temperature, Pressure, Sealants, Strength of materials, Drilling fluids, Safety factors, Oil industry, *Texas, *Oklahoma.
Identifiers: *Drill stem testing, Open hole testing, Cased hole testing, Ultra deep wells, Andarko Basin(Tex-Okla), Delaware Basin(Tex), Annulus pressure, Pretest planning, Differential pressures.

A review is presented of the techniques currently utilized in deep well drill stem testing. The procedures for both open hole and cased hole testing are presented with particular emphasis on the problems and existing solutions to these problems. Data from actual drill stem tests in the Anadarko Basin of Texas and Oklahoma and the Delaware Basin of West Texas are reviewed. The trend for ultra deep wells, those below 20,000 feet, has been increasing during the past few years. The entire drilling and service industry has been challenged to provide the equipment and expertise to drill the wells, evaluate the formations, and provide mechanical equipment for producing them. Formation evaluation of these deep zones by a drill stem test has been successful, but much planning and innovation was necessary. High pressure and high temperature are two factors that present unusual problems. Particular attention must be paid to drill pipe and tubular goods in all deep drill stem tests. Very high mud weights also have received considerable attention in planning a deep drill stem test. A case is presented to show that all deep wells can be safely evaluated with a drill stem test. Planning is the key word in obtaining a successful drill stem test. (Campbell-NWWA)
W74-12538

FACTORS AFFECTING DESIGN, DEVELOPMENT AND COST OF WELLS,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8B.
W74-12541

8D. Soil Mechanics

SEEPAGE RATES AND THE HORIZONTAL FLOW APPROXIMATION,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
E. G. Youngs.
Water Resources Research, Vol 10, No 4, p 874-876, August 1974. 5 fig, 6 ref, 1 append.

Descriptors: *Seepage, *Dams, *Groundwater movement, *Porous media, Conductivity, Dupuit-Forchheimer theory, Hydraulics.

Attention was drawn to a particular case of seepage through a porous body in which the flow is everywhere horizontal and hence easily calculated. In an appendix the seepage through a dam core with a cross section in the shape of an isosceles triangle was shown to be estimated with sufficient accuracy for practical purposes by the horizontal flow approximation. (Schicht-ISWS)
W74-12297

THE HYDROMETER METHOD FOR DETAILED PARTICLE-SIZE ANALYSIS: 1. GRAPHICAL INTERPRETATION OF HYDROMETER READINGS AND TEST OF METHOD,
Agriculture Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
For primary bibliographic entry see Field 2J.
W74-12303

8E. Rock Mechanics and Geology

HOW TO DIAGNOSE A THIEF ZONE,
Continental Oil Co., Ponca City, Okla.
For primary bibliographic entry see Field 8G.
W74-12536

PORE-VOLUME COMPRESSIBILITY OF CONSOLIDATED, FRIABLE, AND UNCONSOLIDATED RESERVOIR ROCKS UNDER HYDROSTATIC LOADING,
Chevron Oil Field Research Co., Richmond, Calif.
G. H. Newman.
Journal of Petroleum Technology, Vol 25, No 2, p 129-134, February, 1973. 8 fig, 12 ref.

Descriptors: *Sandstones, *Limestones, Correlations, *Rock properties, *Consolidation, *Compressibility, Sampling, Porosity, Data, Pressure, Reservoirs, Pores, Cores, Hydrostatic pressure, Freezing.
Identifiers: Net pressure, Friable rocks, Reservoir rocks, *Pore-volume compressibility, Hydrostatic loading.

The use of pore-volume compressibility-porosity correlations in engineering calculations is well known. The correlations developed by Hall (1953) for both sandstones and limestones have been widely distributed. Van der Knaap (1959) published a similar correlation using limestone samples from a single well and also correlated the data with net pressure. Such correlations are attractive because of the simple relationship established. However, those correlations were intended only for well consolidated samples; correlations for friable or unconsolidated samples have not been published. This study compares laboratory data with the published correlations of consolidated samples as well as with values for friable and unconsolidated sandstones. The conclusions reached are: (1) The pore-volume compressibility-porosity values obtained are in poor agreement with published compressibility-porosity correlations. (2) Pore-volume compressibilities for a given porosity can vary widely according to rock type. (3) Attempts to correlate the data showed that consolidated sandstones differed greatly from limestones and friable and unconsolidated sands, but the data are too widely scattered for correlations to be reliable. (Campbell-NWWA)
W74-12542

HYDROLOGY OF RADIOACTIVE-WASTE DISPOSAL AT THE IDAHO CHEMICAL PROCESSING PLANT, NATIONAL REACTOR TESTING STATION, IDAHO,
For primary bibliographic entry see Field 5E.
W74-12546

TIDAL FLUCTUATIONS OF WATER LEVELS IN WELLS IN CRYSTALLINE ROCKS IN NORTH GEORGIA,
For primary bibliographic entry see Field 2F.
W74-12551

DISPOSAL OF URANIUM-MILL EFFLUENT NEAR GRANTS, NEW MEXICO,
For primary bibliographic entry see Field 5E.
W74-12552

8F. Concrete

WHAT'S NEW IN WATER AND SEWER PIPE,
For primary bibliographic entry see Field 8A.
W74-12007

MUD DISPLACEMENT WITH CEMENT SLURRIES,
C. R. Clark, and L. G. Carter.
Journal of Petroleum Technology, Vol 25, No 7, p 775-783, July, 1973. 13 fig, 3 tab, 14 ref.

Descriptors: *Cements, *Muds, Drilling, Drilling fluids, *Slurries, Equipment, Shear stress, Shear strength, Groundwater, Interfaces, Pressure, Pipes, Drag.
Identifiers: Annular space, Displacement, Down-hole environment, Driving forces, Resisting forces, Test cells, Cement/mud interface.

One prerequisite for successful primary cementing is the complete displacement of drilling mud from the annular space. Even after proper techniques for maximum mud displacement efficiency are applied, mud displacement efficiency often remains low. The objective was to re-examine, under conditions closely simulating the down-hole environment, the relative importance of the driving forces available to displace drilling mud from the annulus. The following conclusions were drawn: (1) Pipe movement, either rotation or reciprocation, is a major driving force for mud removal. (2) A well conditioned mud greatly increases mud displacement efficiency. (3) Pipe centralization significantly aids mud displacement. (4) The buoyant driving force resulting from cement-mud density difference has less effect on mud displacement than expected under conditions simulating the down-hole environment. (5) Drag stress at the cement/mud interface can be a significant driving force for mud removal when the cement slurry is in turbulent flow in some part of the annulus. (6) Pipe motion with scratchers substantially improves mud displacement, especially in areas of hole enlargement. (Campbell-NWWA)
W74-12543

8G. Materials

CLEANING WATERMAINS USING POLYURETHANE SWABS.
Water and Pollution Control, Vol 112, No 5, p 34-36, May 1974. 4 fig.

Descriptors: *Pipes, *Cleaning, *Water pressure, *Hydrants, *Canada, Municipal water, Drainage, Bacteria, Disinfection, Hydrogen ion concentration.
Identifiers: *Polyurethane, *Water mains, Compression, Toronto, Swabs, Mains.

A watermain near Toronto, Canada, was cleaned by forcing a polyurethane foam swab through the main via regular water pressures. First, the main valves were closed to isolate the section; the swab was inserted into the top of a compression-type hydrant which had its internal workings previously removed. Water pressure from a fire hose on the hydrant supplied the pressure while the nearest main valve was opened and the swab moved at 100 feet per minute to an open hydrant at the far end of the line. The chance of a swab becoming lodged in a main is small, and can be corrected by a reverse flow. Insertion of the swab is not difficult; most of Ontario's hydrants are of the compression type. For small mains up to 10 inches in diameter there is no problem--it is necessary, however, to ensure the plugging of drain holes. The greatest need for

swabbing is commonly at municipalities using low pH surface water supplies where filtration treatment is not provided. Removal of detritus by swabbing may be condusive to bacterial growth, and swabs are often treated with disinfectant. (Murphy-FIRL)
W74-12006

STORAGE OF PLUTONIUM METAL IN SEALED CANS,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 5D.
W74-12046

ANALYSIS OF ELECTRICAL RESISTIVITY MEASUREMENTS OF SHALLOW DEPOSITS,
Iowa State Univ. of Science and Technology, Ames.
D. W. Tarman.
MSc thesis 1967. 96 p, 22 fig, 1 tab.

Descriptors: *Electrical resistance, Data collections, Surveys, Groundwater, Hydrologic data, Borehole geophysics, Exploration, Subsurface investigations, Till, Alluvium, Glacial drift, Deposition(Sediments), *Iowa, *Measurement.
Identifiers: Wenner method, *Gish-Rooney method, Subsurface materials.

This study was undertaken to analyze several interpretative methods applicable to electrical resistivity data obtained from a geologic setting characteristic of central Iowa. The widespread occurrence of glacial drift in the region requires that data be obtained in ways other than from bedrock exposure. Methods available are borehole investigations, correlation between isolated outcrops and geophysical methods. Of the geophysical methods the electrical resistivity method is, potentially, the fastest and most inexpensive. A resistivity survey was conducted over a preestablished grid on a till covered area and over a series of cross sections in a small alluvium filled valley. The nature of the subsurface materials in both areas was determined through borehole investigations. The resistivity data were analyzed and the values compared to the geologic control. Results indicate that the Gish-Rooney method of continuous depth plotting gives depths which compare most favorably with the geologic control. (Campbell-NWWA)
W74-12525

WATER SYSTEM OPERATOR NEEDS BASIC INFORMATION TO KEEP PUMPS WORKING, PART II,
For primary bibliographic entry see Field 8C.
W74-12526

USE OF ORGANIC POLYMER DRILLING FLUID IMPROVES CORE DRILL EFFICIENCY.
Johnson Drillers Journal, p 1, 13, May-June, 1974.
Identifiers: Revert, Organic polymers, Subsurface formations, Split-tube sampling, Drive-core sampling.

It takes more than just clay and water to make an engineered drilling fluid system. In fact, the best drilling fluid for some types of subsurface formations and some methods of drilling will not contain any clay--the clay being replaced by an organic polymer. Revert finds special application in core-drilling operations. It is easily mixed at the drill site by being sprinkled into the water and recirculated through the pump. Since only a small quantity is required, transport costs are virtually negligible. Numerous interrelated factors affect the cost and results of drilling operations. These include: nature of the formations to be penetrated; capabilities and limitations of drilling equipment; skill, experience and attitude of the drilling crew; accessibility of the job site and cost of transporting materials to the site. Pros and cons of various types of drilling fluids are discussed. Improved core recovery, less hole trouble, and savings in time and materials can be expected when the drilling fluid is carefully considered in the overall plan for test drilling. (Campbell-NWWA)
W74-12533

HOW TO DIAGNOSE A THIEF ZONE,
Continental Oil Co., Ponca City, Okla.
M. Felsenthal.
Journal of Petroleum Technology, Vol 25, No 7, p 839-840, July, 1973. 1 fig, 1 ref.

Descriptors: *Injection wells, *Tracers, Liquids, *Equations, Permeability, Flow, Pressure, Oil wells, Viscosity, Porosity, *Groundwater, Tests, Formulation, Oil industry.
Identifiers: *THIEF zone, Producing wells, Fractions, Waterfloods.

Discussed is a classical method for determining the time required for tracer-tagged liquids to flow from injection wells to producing wells that was formulated by J. C. Calhoun (1953). This method can also be used for evaluating the permeability of the most conductive layer of the formation. This layer may be a 'thief' zone that ought to be closed by subsequent remedial action. Calhoun's method of analysis is time consuming because it involves either a graphical integration or an approximation using a summation of terms. A simpler method was developed that achieves the same purpose with much greater speed and with sufficient accuracy. The method is based on a model of two radial-flow regimes. Radial flow emanates from the injection well, which acts as a 'source,' and converges in the producing well, which acts as a 'sink.' The simpler method was found to be just as effective when using data from a waterflood. The difference in results by the two methods was not considered to be significant for the purposes of the tracer test. (Campbell-NWWA)
W74-12536

HIGH-PRESSURE DRILLING,
For primary bibliographic entry see Field 8C.
W74-12537

THE APPLICATIONS AND LIMITATIONS OF DEEP DRILL STEM TESTING,
For primary bibliographic entry see Field 8C.
W74-12538

PROBLEMS ENCOUNTERED IN DRILLING AND COMPLETING DEEP WELLS,
For primary bibliographic entry see Field 8B.
W74-12540

MUD DISPLACEMENT WITH CEMENT SLURRIES,
For primary bibliographic entry see Field 8F.
W74-12543

THE COST OF GEOPHYSICAL EXPLORATION.
For primary bibliographic entry see Field 8B.
W74-12544

A REVIEW OF CORROSION MONITORING TECHNIQUES,
Fincher, D. R. and Nestle, A. C.
D. R. Fincher, and A. C. Nestle.
Society of Petroleum Engineers of AIME Preprint SPE 4220, 1972. 14 p, 2 tab, 12 ref.

Descriptors: *Corrosion, Equipment, Metallurgy, *Rusting, Monitoring, Control systems, Maintenance, *Corrosion control, Scour, Erosion, Abrasian, X-ray analysis, Gamma rays, Resistivity, Hydrogen, Oxygen, Carbon dioxide, Liquids, Solids, *Reviews.
Identifiers: Metallic systems, *Corrosion detection, Radiography, Electrical resistance technique, Polarization, Resistance method, Galvanic method, AC resistivity technique, Hydrogen probes, Corrograms.

Operators of metallic systems are looking for new and better tools to monitor, measure, or detect changes both in the metal structure itself and in the rate of attack that the structure is experiencing. To prevent corrosion damage, it is necessary to know when, where, and why the attack is occurring. Otherwise, damage can occur before the owner has knowledge of the attack. Corrosion can be monitored or detected using 'after-the-fact' type tools for detection. Perhaps the oldest detection technique is a visual inspection coupled with measurement of pit depths and/or wall thickness. Ultrasonic and x-ray equipment also can be used to determine the extent of damage. Downhole tubing and casing calipers, possibly in conjunction with wall thickness measurements, can be used periodically to assess the extent of corrosion damage. Perhaps the most desirable monitoring techniques are those that are used more or less continually to determine the rate of corrosion attack. These methods also are suitable to assess the success or failure of the corrosion mitigation measures used. Also, a new corrosion monitor-controller is described. Each of the methods has certain advantages, and the practical applications of these different techniques are reviewed. (See also W74-07857) (Campbell-NWWA)
W74-12550

INTRODUCTION TO BASIC REMOTE SENSING FOR ENGINEERING GEOLOGISTS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 7B.
W74-12553

EXPERIENCE IN SANITARY EVALUATION OF THE USE OF POLYETHYLENE PIPES FOR RURAL WATER SUPPLY LINES, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
For primary bibliographic entry see Field 5D.
W74-12716

8H. Rapid Excavation

PROJECT DRUM INLET: EXPLOSIVE EXCAVATION IN SATURATED SAND,
Army Engineer Explosive Excavation Research Lab., Livermore, Calif.
C. M. Snell, and R. H. Gillespie.
Available from NTIS, Springfield, Va. 22161 as AD-769 581, Price $3.75 printed copy; $2.25 microfiche. Technical Report E-73-5, August 1973. 81 p, 32 fig, 8 tab, 30 ref.

Descriptors: *Explosives, *Excavation, *Inlets(Waterways), *North Carolina, Dredging, Canals.
Identifiers: Outer Banks(NC).

A 385-ft-long section of sand separating the Core Sound, North Carolina, from the Atlantic Ocean was excavated with large explosive charges. Twenty-two separate canisters each containing 1 ton of aluminized ammonium-nitrate slurry were emplaced in two rows. All charges were detonated simultaneously at 1327 hours, December 23, 1971. The detonation successfully removed the sand barrier, forming a continuous channel over 80 ft in width. This channel subsequently washed out to a width of about 1000 ft and was used as an access route to the Raleigh Bay fishing grounds. The project demonstrated the practicality of explosive channel excavation in saturated sand. (Knapp-USGS)
W74-12014

8I. Fisheries Engineering

SURFACE-WATER INVESTIGATIONS ON THE LUMMI INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4A.
W74-12008

DISTRIBUTION AND RELATIVE ABUNDANCE OF FISHES IN NEWPORT RIVER, NORTH CAROLINA,
National Marine Fisheries Service, Beaufort, N.C.
W. R. Turner, and G. N. Johnson.
NOAA Technical Report NMFS-SSRF-666, September 1973. 23 p, 1 fig, 13 tab, 20 ref.

Descriptors: *Fisheries, *North Carolina, *Fish populations, Rivers, Number fish per acre, Estuarine fisheries, Sampling, Marine fish, Freshwater fish.
Identifiers: *Newport River(NC).

In Newport River, North Carolina, during 1970, 104 species of fishes were found in monthly sampling. Sampling extended from the lower reaches of the estuary upstream into tidal freshwaters, and covered a mid-channel distance of 34.87 km. Most of the species of fishes collected in the system were marine forms. Only 15 essentially freshwater species were collected and 5 of these (longnose, gar, gizzard shad, golden shiner, white catfish, and black crappie) showed varying degrees of tolerance for saline waters. Seven species made up 97% of the total catch which comprised nearly 129,000 individuals. The dominant species were all marine euryhaline forms that used the estuary as a nursery area, penetrating well upstream into brackish or even tidal freshwaters. Seasonal distribution and abundance of the dominant species, as well as other species collected in substantial numbers, are discussed. Biomass of fishes in collections by haul seine was estimated at 0.93 g/sq m for littoral waters of the estuary. (Knapp-USGS)
W74-12064

A MANUAL OF FLATFISH REARING,
Skidaway Inst. of Oceanography, Savannah, Ga.
D. B. White, and R. R. Stickney.
Available from NTIS, Springfield, Va 22161 as COM-74-10364, Price $3.25 printed copy; $2.25 microfiche. Georgia University Marine Science Center, Technical Report Series, No 73-7, September 1973. 36 p, 6 fig, 3 tab, 37 ref.

Descriptors: *Fish hatcheries, *Fish farming, Fish management, *Aquiculture, Bottom fish, Bibliographies, Fish stocking.
Identifiers: *Flatfish.

Flatfish may be reared under controlled or semicontrolled laboratory conditions; however, basic knowledge on specific environmental and nutritional parameters is not now available for most flatfish species. The selection of a proper site is probably the most important step toward establishing a facility. Water of low turbidity is highly desirable in culture facilities because outbreaks of disease organisms are often associated with particulate material in the water. Feeding is also enhanced in clear water since the fish are better able to see food particles. Low bacterial and viral levels are required. The site should be located away from any types of industrial or municipal pollution. The water supply should be 0.5 to 2% salinity. Water with a constant temperature of approximately 25 C should provide rapid growth. (Knapp-USGS)
W74-12075

LAKE SUPERIOR INVESTIGATIONS,
Minnesota Dept. of Conservation, St. Paul. Div. of Game and Fish.
R. Hassinger, and A. Kuechenmeister.
Available from NTIS, Springfield, Va 22161 as COM-73-10800, Price $3.00 printed copy; $2.25 microfiche. Minnesota Department of Natural Resources Lake Superior Investigations Completion Report for April 1968 to June 1971. Released October 1971. 7 p, 8 tab.

Descriptors: *Lake Superior, *Lake trout, *Lampreys, *Fish stocking, Fish populations, Fish management, Fisheries, Life history studies, *Minnesota.
Identifiers: *Whitefish.

The Lake Superior lake trout rehabilitation program in Minnesota waters is evaluated by assessment netting. Lake trout abundance steadily increased to 20.7 pounds per thousand feet of net lifted in 1970, then decreased slightly to 17.4 pounds per thousand feet of net in 1971. The incidence of lamprey marks shows an increasing trend. The total wounding rate (fresh and old scars) has increased to 33.6 percent in 1971. Whitefish grounds in Minnesota waters are vey limited with the only area of consistent production in Grand Portage Bay. During the period whitefish abundance has remained at a high level although a decrease was noted in 1971. The bulk of commercial harvest is in the size group 20-24 inches. These whitefish are from 4 to 8 years old. Lamprey marks on whitefish increased in 1971 corresponding with a decrease in abundance. (Knapp-USGS)
W74-12079

WAYS OF INTENSIFYING HATCHERY BREEDING OF STURGEONS IN THE DAM REGIONS OF HYDROELECTRIC STATIONS, (IN RUSSIAN),
F. I. Vovk.
Tr Vologr Otd Nauchno-Issled Inst Ozern Rechn Rybon Khoz. 6. p 125-159, 1972.
Identifiers: *Breeding control, Dams, Flow control, *Sturgeons, Temperature, Hydroelectric powerplants, *Fish hatcheries.

The organization and bioengineering of fish-breeding processes at sturgeon hatcheries located in the dam stretches of rivers are affected by the characteristics of the water regime in connection with stream-flow control. This is reflected in the breeding quality of the spawners. The forced change to pond water and the new operating schedule involve a departure from the optimal regime in all hatchery departments--all operations were done at higher than normal temperatures and with large daily variations. One of the most important measures is the complete regulation of water temperature, beginning from the moment of stocking the spawners to the stocking of the rearing ponds with fry. For this purpose it is necessary to modernize the fish-breeding units and to transfer them to closed rooms. It is also necessary to improve the incubation apparatus method of degumming the eggs, counting the juveniles released from the ponds and qualitative evaluation of production.--Copyright 1973, Biological Abstracts, Inc.
W74-12149

COMPARATIVE ANALYSIS OF FEEDING OF ONE-SUMMER-OLD PELED COREGONUS PELED (GMELIN), CHIR COREGONUS NASUS (PALLAS) AND THEIR HYBRIDS GROWN TOGETHER, (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).
B. B. Voloshenko.
Vopr Ikhtiol. Vol 13, No 4, p 684-691, Illus, 1973.
Identifiers: Acantocyclops, Bosmina, Ceriodaphnia, Chaoborus, Chir, Chironomus, *Coregonus-nasus, *Coregonus-peled, Cricotopus, Cyclops, Daphnia, Endochironomus, Glyptotendipes, Microtendipes, Oligochaeta, Ostracoda, Polypenilum, Procladius, Sida, Tanytarsus, *Fish diets, Seasonal, Fish hybrids.

The nutrition of 1-summer-old Coregonus peled and C. nasus and their reciprocal hybrids was studied under conditions of pond cultivation. Data are presented which characterize the anatomical structure of the mouth and gullet-branchial apparatus, which determines the nature of the nutrition of the fish studied. Hybrid forms of these species are able to utilize the fodder base of the pond more fully and the efficiency of pisciculture increased significantly. Fodder included: Cyclops, Acantocyclops, Daphnia, Ceriodaphnia, Bosmina, Sida, Ostracoda, Oligochaeta, Endochironomus, Procladius, Glyptotendipes, Microtendipes, Polypedilum, Chironomus, Cricotopus, Ephemeroptera, Trichoptera, Tanitarsus, Chironomidae and Chaoborus.--Copyright 1974, Biological Abstracts, Inc.
W74-12163

HYDROLOGICAL AND PHYSICOCHEMICAL CHARACTERISTICS OF THE FISH PONDS OF SOUTHERN TADZHIK SSR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 2H.
W74-12166

DATA ON THE HYDROBIOLOGY OF FISH PONDS OF SOUTHERN TADZHIK SSR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
S. A. Andrievskaya, N. I. Bogdanov, and F. A. Akhrorov.
Izv Akad Nauk Tadzh SSR Otd Biol Nauk. 2. p 73-76, Illus, 1973.
Identifiers: Algae, *Bacteria, *Benthos, *Carp, Fertilization, *Fish breeding, Grass carp, Hydrobiology, Macrophytes, *Phytoplankton, Seasonal, *USSR(Southern Tadzhik SSR), Fish ponds, *Chlorophyta, Biomass.

Data are given on seasonal dynamics of the population and biomass of bacteria, phytoplankton, zooplankton and zoobenthos in 2 experimental ponds (fertilized) and 1 control pond (unfertilized) used for raising carp and grass carp. The population and biomass of plankton and benthos in the experimental ponds exceeded that of the control pond. The development of aquatic organisms in the ponds depended on the fertilizers applied to them. The food base of the fertilized ponds was higher than in the unfertilized. The intestine of the carp contained 15 spp. and forms of benthos in addition to macrophytes, whereas the food composition of the grass carp was more uniform and consisted mainly of green algae, foulings and macrophytes. The investigation was carried out on the ponds of the 'Chubek' fishery located along the former bed of the Afgan-Darya River in southern Tadzhikistan.--Copyright 1974, Biological Abstracts, Inc.
W74-12167

RECLAMATION OF WATER FOR REUSE IN CHANNEL CATFISH RACEWAY SYSTEMS,
Memphis State Univ., Tenn. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W74-12203

MINERAL FERTILIZATION OF CARP PONDS IN POLYCULTURAL REARING,
Institut fuer Suswasserfischzucht, Plovdiv (Bulgaria).
For primary bibliographic entry see Field 5C.
W74-12246

EFFECTS OF AERATION IN EARTHEN PONDS ON WATER QUALITY AND PRODUCTION OF WHITE CATFISH,
South Carolina Agricultural Experiment Station, Clemson.
For primary bibliographic entry see Field 5C.
W74-12251

RESIDUAL CHLORINE RETENTION AND POWER PLANT FISH FARMS,
Oceanic Inst., Waimanolo, Hawaii.
For primary bibliographic entry see Field 5C.
W74-12266

A SHORT TERM TREATMENT OF MALACHITE GREEN AND FORMALIN FOR THE CONTROL OF ICHTHYOPHTHIRIUS MULTIFILIIS ON CHANNEL CATFISH IN HOLDING TANKS,
Alabama Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
For primary bibliographic entry see Field 5G.
W74-12269

OBSERVATIONS ON THE SPAWNING OF THE MISSISSIPPI SILVERSIDES, MENIDIA AUDENS, HAY,
California State Dept. of Fish and Game, Sacramento.
F. Fisher.
Calif Fish Game. Vol 59, No 4, p 315-316. 1973.

Descriptors: Fish, *Spawning, *Fish behavior, *California.
Identifiers: Menidia-audens, *Mississippi silversides, *Lexington Reservoir(Calif).

The spawning behavior is described as observed in Lexington Reservoir, Santa Clara County, California, on May 11, 1973. This fish was introduced into California in 1967, orginally in Clear Lake.--Copyright 1974, Biological Abstracts, Inc.
W74-12688

ECOLOGY AND PRODUCTION OF JUVENILE SPRING CHINOOK SALMON, ONCORHYNCHUS TSHAWYTSCHA, IN A EUTROPHIC RESERVOIR,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W74-12692

THE USE OF SODIUM CYANIDE AS A FISH ERADICANT IN SOME QUEBEC LAKES,
Sir George Williams Univ., Montreal (Quebec). Dept. of Biological Sciences.
G. Leduc, Y. Gravel, L. R. Seguin, B. Vincent, and F. Guibert.
Nat Can (Que). Vol 100, No 1, p 1-10. 1973. Illus.

Descriptors: *Piscicides, Pesticide, *Brook trout, Trout, Toxicity, Fry, Fish, Lakes, Fish management, Canada.
Identifiers: Quebec, Sodium cyanide.

The use of sodium cyanide as a fish eradicant was studied for 4 yr and involved the treatment of 1 pond and 5 small mountain lakes of different sizes and depths, where a total of at least 15 spp. of cold and warm water fishes were encountered. Technical sodium cyanide was applied in briquettes and granular forms at a concentration of 1 ppm and, in most instances, a complete fish-kill was achieved. The toxicity disappeared within 25-40 days, and there was evidence of excellent growth of the brook trout fingerlings planted afterwards. It is possible to handle large quantities of sodium cyanide safely, and this can markedly reduce the cost of lake reclamation programs.--Copyright 1973, Biological Abstracts, Inc.
W74-12696

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

METHODS FOR TRANSFERRING WATER RESOURCES RESEARCH FINDINGS TO PRACTICING ENGINEERS,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 10D.
W74-12363

9C. Research Facilities

UNITED STATES GEOLOGICAL SURVEY ALASKA PROGRAM, 1974.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-12012

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

SELECTED BIBLIOGRAPHY ON WATER BALANCE OF MONSOON ASIA (III),
Meteorological Research Inst., Tokyo (Japan).
For primary bibliographic entry see Field 2B.
W74-12019

WASTE PROCESSING IN THE CHEMICAL AND PETROCHEMICAL INDUSTRIES--A BIBLIOGRAPHY WITH ABSTRACTS,
National Technical Information Service, Springfield, Va.
For primary bibliographic entry see Field 5D.
W74-12069

10C. Secondary Publication And Distribution

DIRECTORY OF MANAGERS, ENGINEERS AND SCIENTISTS IN OCEAN WASTE DISPOSAL AND RELATED ENVIRONMENTAL SCIENCE FIELDS,
Interstate Electronics Corp., Anaheim, Calif. Oceanics Div.
For primary bibliographic entry see Field 5E.
W74-12020

ACTIVE PROJECTS, PURE WATERS RESEARCH.
New York State Dept. of Environmental Conservation, Albany.
February 1974. 33 p.

Descriptors: *Water pollution control, *Water quality control, *New York, *Water conservation, Research priorities, Metropolitan studies, Environmental control, Waste water treatment, Eutrophication, Nutrient removal, Sludge disposal, Scientific personnel.
Identifiers: *Active research projects, Research needs.

Active research projects of the Research and Development Unit of the New York State Department of Environmental Conservation are described. These projects are titled: (1) Candadarago Lake Eutrophication Study, (2) Effectiveness of Lagoons as a Tertiary Treatment Device, (3) Evaluation of a Plastic Media Trickling Filter, (4) Fate of Applied Nutrients in Streams, (5) Land Disposal of Wastewater, (6) Nitrogen Removal by Chlorination, (7) Occurrence and Transport of Nutrients and Hazardous Polluting Substances, (8) Reduction of the Eutrophication of Lower St. Regis Lake by Point Source Phosphorus Removal, and (9) West Coxsackie Project. Lists are included of research personnel and planned future publications. Also given is the current status of 33 reports of the Department concerning environmental quality. Research needs listed are studies of: (1) urban, suburban, recreational and agricultural land runoff water quality; (2) eutrophication of lakes; (3) the development of an economical and workable individual home waste treatment unit; (4) operation of existing wastewater treatment plants; (5) movement of phosphours through soils, (6) means of improving the efficiency and reliability of wastewater treatment processes; (7) sludge disposal technology; (8) nitrogen removal from wastewater; (9) infiltration into sanitary and combined sewers; (10) disposal of toxic materials removed from wastewaters; and (12) economical means to prevent pollution from combined sewer overflows. (Poertner)
W74-12234

COASTAL - ESTUARINE AND NEARSHORE PROCESSES, AN ANNOTATED BIBLIOGRAPHY,
Ocean Engineering Informaton Service, La Jolla, Calif.
For primary bibliographic entry see Field 2L.
W74-12351

10D. Specialized Information Center Services

TOXIC MATERIALS INFORMATION CENTER,
Oak Ridge National Lab., Tenn. Environmental Information Systems Office.
E. D. Copenhaver, G. U. Ulrikson, L. S. Corrill, B. K. Wilkinson, and L. T. Newman.
In: ORNL-NSF-EATC-6, p 393-406, January 1974. 1 fig, 6 tab, 11 ref.

Descriptors: *Toxicity, *Toxins, *Information exchange, *Information retrieval, Documentation, Publications, Data collections, Bibliographies, Cadmium, Arsenic, Environment.
Identifiers: *Toxic Materials Information Center.

The Toxic Materials Information Center (TMIC) of the Environmental Information System Office collects, stores, and disseminates pertinent information on materials in the environment, with particular emphasis on toxic elements and organometallic compounds. Originally established as a project support center for the EATC Program, TMIC continues to fill this need along with a broader role of information retrieval and dissemination for the whole NSF/RANN Environmental Aspects of Trace Contaminants Program. During the reporting period, TMIC has created data bases pertinent to trace contaminants research; provided information retrieval and acquisition of nonlocal documents and papers; maintained a program library and distribution lists for the EATC Program; and has published special annotated bibliographies on cadmium and arsenic, four issues of NSF/RANN Trace Contaminants Abstracts, and NSF/RANN Trace Contaminants Program Directory. TMIC has also participated in the preparation of state-of-the-art reviews and has completed a preliminary study on the feasibility of extracting environmental data in a tabular format. (See also W74-12021) (Houser-ORNL)
W74-12035

EFFLUENT MANAGEMENT INFORMATION SYSTEM (EMIS),
Development Sciences, Inc., East Sandwich, Mass.
For primary bibliographic entry see Field 5G.
W74-12082

A Q-METHODOLOGICAL STUDY OF ATTITUDES TOWARD WATER RESOURCES AND IMPLICATIONS FOR USING MASS MEDIA IN DISSEMINATION OF WATER RESEARCH RESULTS,
Missouri Univ., Columbia. Water Resources Research Center.
For primary bibliographic entry see Field 6B.
W74-12192

METHODS FOR TRANSFERRING WATER RESOURCES RESEARCH FINDINGS TO PRACTICING ENGINEERS,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. C. Lamb, III.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 046, $3.75 in paper copy, $2.25 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Completion Report, (UNC-WRRI-74-96), Report No 96, June 1974. 48 p, 2 fig, 15 tab. OWRT A-066-NC(1). 14-31-0001-3833.

Descriptors: *Information exchange, *Information retrieval, *Research, *North Carolina, *Education, *Training, Engineering education.
Identifiers: *Technology transfer, Information transfer, Information dissemination, Continuing education.

Origins of communications problems between researchers and those who should use their findings in solving real-world problems are reviewed. Existing systems for continuing education of water resources professionals are seriously deficient in resolving these problems. A survey identified those areas of water resources knowledge of greatest interest to practicing professionals in North Carolina. Over 500 responses indicating serious interest in enhancing professional knowledge in this field. The questionnaire assayed demand for educational materials in 44 specific topics, views on delivery methods, and biographical data for the respondents. Available techniques for information transfer were surveyed and evaluated for potential application under conditions prevalant in North Carolina. At this time special printed materials, taped lectures and slides represent the most practical tools, considering personnel available for their preparation and facilities to which most participants would have access. More complex materials, such as movies, taped television lectures and computer assisted instruction, should be developed but would have minor application immediately because of limitations in personnel and physical facilities. Pilot modules based on taped lectures, slides and written materials were prepared and tested with representative groups of practicing professionals and found to be an effective method of transferring research findings to water resources engineers and other practitioners, if assembled into modules interesting and relevant to their problems and needs. (McJunkin-North Carolina State)
W74-12363

THE DEVELOPMENT AND OPERATION OF A PROTOTYPE STATE ENVIRONMENTAL INFORMATION CENTER,
East Central State College, Ada, Okla. Environmental Information and Media Center.
R. V. Garner.
Final Conference Report for the National Conference on Managing the Environment, Environmental Protection Agency, Washington, D.C., p. VI:32-VI:34. 1974.

Descriptors: *Libraries, *Information exchange, *Information retrieval, *Education, Data collections, Data transmission, Local governments, State governments, Budgeting, Costs, Computers, Films, Documentation, Research facilities.
Identifiers: Oklahoma Environmental Information and Media Center(OEIMC).

The Oklahoma Environmental Information and Media Center (OEIMC) was established by the Oklahoma legislature to meet the pressing need for comprehensive environmental data. Two broad categories were established: (1) short range, i.e., problem solving, enforcement and training, includes environmental management information for small industry, enforcement information for local and state agencies, training materials, and information necessary for research activities, and material solicited by the public; and (2) long range, i.e., education, continuing research and public information, encompasses information for curriculum building, for special interest groups, and for governmental and industrial planning activities. Acquisition of documents, microfiche, abstract listings, films, periodicals, newsletters, journals, and a referral list of environmental expertise began. OEIMC performs a variety of services: (1) problem requests for easily retrievable information, (2) educational displays, (3) a field service for local government and small industry facilitating use of the center's resources, (4) publication of a periodical, and (5) media presentations. Cost factors currently necessitate manual information searches, but an increasing number of requests obviates the use of automation. One such automated system employing a hard wire associative logic, using limited software, easily accessed by keyboard, and accommodating remote terminals is now on loan to OEIMC and will soon be purchased. (See also W74-12457) (LaPointe-North Carolina)
W74-12473

10F. Preparation Of Reviews

THE EFFECTS OF ENVIRONMENTAL STRESS ON OUTBREAKS OF INFECTIOUS DISEASE OF FISHES,
Eastern Fish Disease Lab. Bureau of Sport Fisheries and Wildlife, Kearneysville, W. Va.
For primary bibliographic entry see Field 05C.
W74-12249

COASTAL MARINE POLLUTION AND FISH,
Fisheries Research Board of Canada, West Vancouver, B.C. Pacific Environmental Inst.
For primary bibliographic entry see Field 05C.
W74-12252

RESEARCH NEEDS IN WATER QUALITY CRITERIA, 1972.
National Academy of Sciences-National Academy of Engineering, Washington, D.C. Environmental Studies Board.
For primary bibliographic entry see Field 05G.
W74-12675

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W74-12276 5C

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- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

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- NATURE OF WATER
- WATER CYCLE
- WATER SUPPLY AUGMENTATION AND CONSERVATION
- WATER QUANTITY MANAGEMENT AND CONTROL
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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 24
DECEMBER 15, 1974

W74-12751 -- W74-13500

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 7, NUMBER 24
DECEMBER 15, 1974

W74-12751 -- W74-13500

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

DEPOLARIZED RAYLEIGH SCATTERING AND HYDROGEN BONDING IN LIQUID WATER,
Catholic Univ. of America, Washington, D.C.
C. J. Montrose, J. A. Bucaro, J. Marshall-Coakley, and T. A. Litovitz.
The Journal of Chemical Physics, Vol 60, No 12, p 5025-5029, June 15, 1974. 5 fig, 20 ref.

Descriptors: *Hydrogen bonding, *Water structure, Water properties, Kinetics, Liquids, Molecular structure, Temperature, Spectroscopy.
Identifiers: *Rayleigh scattering.

Depolarized Rayleigh scattering spectra were obtained for water over essentially its entire liquid range at atmospheric pressure. Three principal components of the Rayleigh line were identified and are described in terms of reorientation of the molecules, the formation and breaking of hydrogen bonds between molecules, and polarizability anisotropies resulting from the collisions or interactions among several molecules. For the region of the spectrum 0 to 50 cm(-1), the most intensive component of the spectrum has been ascribed to hydrogen bond kinetics; from it the mean lifetime of a hydrogen bond in water was determined as a function of temperature. (Witt-IPC)
W74-12922

STUDY OF THE STRUCTURE OF MOLECULAR COMPLEXES. VI. DIMERS AND SMALL CLUSTERS OF WATER MOLECULES IN THE HARTREE-FOCK APPROXIMATION,
IBM Research Lab., San Jose, Calif.
H. Kistenmacher, G. C. Lie, H. Popkie, and E. Clementi.
The Journal of Chemical Physics, Vol 61, No 2, p 546-561, July 15, 1974. 14 fig, 6 tab, 32 ref.

Descriptors: *Water structure, *Molecular structure, Energy, Theoretical analysis, Stability, Model studies, *Water properties.
Identifiers: Hartree-Fock approximation.

The analytical fit to a large number of Hartree-Fock computations for the water-water interaction was reanalyzed and used to study small clusters of water molecules. With the analytically fitted Hartree-Fock potential, thousands of possible configurations for the dimers, trimers, tetramers, pentamers, hexamers, heptamers, and octamers of water were compared in order to determine the configuration of lowest energy (maximal stabilization energy). For the dimer two possible stable configurations are found, corresponding to an open form and a cyclic form, with the open form being more stable. For the trimers and tetramers the cyclic forms are somewhat more stable than the open structures. For the larger clusters it is concluded that it is rather meaningless to consider a single structure, but what is physically relevant is the statistical distribution of different configurations, since many configurations with significantly different geometry have nearly the same energy. The comparison of the stabilization energy per molecule of the different clusters with the corresponding value for liquid water does not support the mixture-model theories of the structure of liquid water. (Witt-IPC)
W74-12923

STRUCTURE OF LIQUID WATER. STATISTICAL THERMODYNAMIC THEORY,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
A. T. Hagler, H. A. Scheraga, and G. Nemethy.
Journal of Physical Chemistry, Vol 76, No 22, p 3229-3243, Oct. 26, 1972. 9 fig, 6 tab, 45 ref.

Descriptors: *Water structure, *Molecular structure, *Thermodynamics, Theoretical analysis, Hydrogen bonding, Mathematical models, Model studies, Water, Statistical methods.

A statistical thermodynamic treatment is presented for a model of liquid water which consists of a continuous distribution of cluster sizes in equilibrium. A partition function is written for this model, and the distribution of cluster sizes, the median cluster size, and the mole fraction of unbroken hydrogen bonds are calculated. The median cluster size is 11.2 at 0C, and at no temperature is there a significant number of large clusters (more than 60). The approximations made in the theory are analyzed in terms of their effects on the results and in relation to similar approximations made in other theories. The inapplicability of a two-state model to liquid water is also discussed terms of the results obtained. (See also W74-13418) (Witt-IPC)
W74-13417

STRUCTURE OF LIQUID WATER. II. IMPROVED STATISTICAL THERMODYNAMIC TREATMENT AND IMPLICATIONS OF A CLUSTER MODEL,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
B. R. Lentz, A. T. Hagler, and H. A. Scheraga.
Journal of Physical Chemistry, Vol 78, No 15, p 1531-1550, July 18, 1974. 11 fig, 9 tab, 64 ref.

Descriptors: *Molecular structure, *Water structure, *Thermodynamics, Model studies, Theoretical analysis, Water properties, Water, Mathematical models, Hydrogen bonding, Statistical methods.

An earlier statistical thermodynamic treatment of a cluster model of liquid water is extended, and many of its approximations are improved. The results of recent LCAO-MO calculations are used to estimate the effects of cooperativity on the internal partition function of a cluster; these effects unexpectedly make large-size clusters unfavorable. Hydrogen-bonded ring structures are also included in the model. The intermolecular normal mode frequency spectrum of a cluster is calculated explicitly by making use of a recently proposed 'effective pair potential' for water molecule interactions. These and other improvements over the earlier treatment are incorporated into a partition function, and the thermodynamic properties of liquid water are calculated over the range of 0 to 100C, using only two adjestable parameters. The distribution of cluster species resulting from these calculations contains only small clusters (size less than 10), and the mole fraction of H bonds decreases from 0.47 at 0C to 0.43 at 100C. The intermolecular vibrational spectrum of liquid water (and its temperature dependence) is calculated from the distribution of cluster species and their normal mode frequencies. The approximations made in the theory are analyzed in terms of their effect on the results and of their implications for the structure of liquid water. The results of the calculations have much in common with the continum point of view. They also provide a tentative explanation for the apparent 'two-state' properties of water. (See also W74-13417) (Witt-IPC)
W74-13418

RAMAN SPECTRA AND STRUCTURE OF WATER FROM -10 TO 90 (DEGREES C),
Regional Research Lab. Agricultural Research Service, Berkeley, Calif.
J. R. Scherer, M. K. Go, and S. Kint.
Journal of Physical Chemistry, Vol 79, No 13, p 1304-1313, June 20, 1974. 11 fig, 4 tab, 33 ref.

Descriptors: *Heavy water, *Water structure, Water, Molecular structure, Spectroscopy, Hydrogen bonding, Deuterium, Water properties, Thermodynamics, Polarity.
Identifiers: *Raman spectra.

Raman spectra were obtained for liquid water (H2O) and heavy water (D2O) from -10 to 90C and HOD from 10 to 90C. Quantitative intensities were measured for water and heavy water, and the intensity sum rule was found to hold within 10%. The difference between the dopolarization ratios of the OH and OD streches of HOD is explained on the basis of approximate normal coordinates and bond polarizability theory. The occurrence of apparent isosbestic points is observed Raman data that has not been decomposed into its isotropic and anisotropic parts is shown to be fortuitous. The isotropic and anisotropic spectra of the OH and OD stretching regions of water and heavy water are interpreted in terms of four bands. These bands are attributed to the symmetric and antisymmetric OH and OD stretching vibrations of a symmetrically H-bonded comples and the stretching vibrations of an asymmetrically H-bonded complex. Fermi resonance is shown to be responsible for the dip in the spectrum at the position of the first overtone of the HOH and the DOD bending vibrations. The band-fitting procedure is constrained by assumptions involving half-widths, band centers, and intensity arguments. The resulting analysis associates the intensity increase with decreasing temperature at 3430/cm, (2530/cm for heavy water), in the anisotropic spectrum with the antisymmetric OH stretching vibrations of the symmetric H-bonded comples. (Witt-IPC)
W74-13419

2. WATER CYCLE

2A. General

FILTER PROCESSES IN RIVER BEDS,
Karlsruhe Univ. (West Germany).
S. G. Van Riesen.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ., Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 482-494, 1972. 6 fig, 13 ref.

Descriptors: *Clogging, *Alluvial channels, *Induced infiltration, Surface-groundwater relationships, Sediments, Water pollution effects, Sedimentation, Artificial recharge.

When clean or polluted water infiltrates into a porous medium such as a river bed, clogging can result. The causes for clogging processes in beds of standing or flowing water and the mechanisms eliminating clogging in a filter matrix are discussed. The experimental procedures and results of tests using two hydraulic models are described. (See also W74-12811) (Knapp-USGS)
W74-12840

SPATIAL PATTERNS OF LONG-PERIOD STREAMFLOW FLUCTUATIONS IN THE EUROPEAN USSR,
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
N. P. Smirnov.
Soviet Hydrology, Selected Papers No 2, p 112-122, 1973. 6 fig, 7 tab, 9 ref. Translated from Water Resources (Vodnyye resursy), No 2, p 21-32, 1973.

Descriptors: *Spatial distribution, *Correlation analysis, *Streamflow, *Hydrology, Distribution patterns, Statistical methods, Average flow, Time series analysis, Fluctuations, Regional analysis, Networks, Hydrologic data, Gaging stations.
Identifiers: *USSR, Regionalization, Long-period streamflow fluctuations.

Data on average annual discharges at 19 gaging stations from 1915 to 1964 were used to study long-period streamflow fluctuations in the European USSR. The drainage area size ranges from 45,900

to 1,211,003 sq km and averages annual discharges from 110 to 7,760 cu m/sec. The method of expansion in natural orthogonal functions was used to investigate the runoff variations and the generalized parameters permitted the entire European USSR to be divided into six regions. (Humphreys-ISWS)
W74-12981

MODELLING OF SURFACE RUNOFF SYSTEMS BY AN ARMA MODEL,
Indian Inst. of Tech., New Delhi. Dept. of Civil Engineering.
S. K. Spolia, and S. Chander.
Journal of Hydrology, Vol 22, No 3-4, p 317-332, 1974. 6 fig, 1 tab, 15 ref.

Descriptors: *Surface runoff, *Mathematical models, *Model studies, *Rainfall-runoff relationships, Streamflow, Rainfall, Runoff, Storms, Parameters, Systems analysis, Hydrology, Watersheds(Basins).
Identifiers: *Nash's model, *Autoregressive models, Autoregressive cum moving average(ARMA), Deterministic models, Stochastic models.

An autoregressive cum moving average (ARMA) formulation for modelling of surface runoff systems was proposed. It emerged from this study that Nash's model is a special case of this formulation. The structural relationships between the parameters of the general ARMA and the conceptual formulations were established. A particular case of the general ARMA formulation was proposed for the modelling of a system's surface runoff behavior. The formulation corresponds to a conceptual model of two linear reservoirs in series. This model was investigated for its stability, nature of response function, and range of parameter values. (Jess-ISWS)
W74-12993

STATE VARIABLE MODEL OF OVERLAND FLOW,
Alberta Dept. of Environment, Edmonton. Div. of Technical Services.
I. Muzik.
Journal of Hydrology, Vol 22, No 3-4, p 347-364, 1974. 10 fig, 1 tab, 12 ref.

Descriptors: *Systems analysis, *Mathematical models, *Overland flow, *Model studies, Hydraulics, Hydrographs, Rainfall, Laboratory tests, Mannings equation, Hydrologic systems, Equations, Continuity equation, Momentum equation, Recession curves, Hydrologic cycle, Watersheds(Basins).
Identifiers: Laboratory catchment, State variable model.

The state variable approach to systems analysis and synthesis was used to develop a lumped mathematical model of overland flow. The model describes the unsteady non-uniform flow in terms of a set of first order ordinary differential equations and a set of arithmetic equations. Conceptually the model consists of a series of interacting reaches with unsteady uniform flow subjected to impulse inputs. Changes in hydraulic roughness due to the rainfall impact effects are accounted for. The regeneration performance of the model was tested by comparison with experimental hydrographs of overland flow from a laboratory catchment. Close agreement between experimental and calculated hydrographs was obtained for both uniformly distributed as well as temporally and spatially varied rainfall inputs. The state variable approach is not limited to overland flow; it provides a comprehensive mathematical framework for a general hydrologic model. (Jess-ISWS)
W74-13008

DETERMINISM AND STOCHASTICITY IN HYDROLOGY,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
V. Yevjevich.
Journal of Hydrology, Vol 22, No 3-4, p 225-238, 1974. NSF Grant GK-31512X.

Descriptors: *Research and development, *Stochastic processes, *Hydrology, *History, Water resources, Theoretical analysis.
Identifiers: *Research design, Research planning, Research philosophy.

Historic controversies between deterministic and stochastic approaches in the research of natural phenomena were reviewed and constrasted to similar controversies in the field of hydrology. Two hydrologic eras associated with determinism were described and illustrated with examples. Each was evaluated for its contribution to hydrologic understanding. Limitations of the contemporary deterministic response hydrology in the analysis of classical hydrologic processes were emphasized. In terms of stochasticity, properties of hydrologic processes were described as either periodic-stochastic or purely stochastic. Both were explained and illustrated. Deterministic and stochastic approaches must be optimally integrated for the utmost mathematical-physical understanding and description of hydrologic processes and environments. (Jess-ISWS)
W74-13010

QUASI-BIENNIAL STREAMFLOW VARIATION IN THE USSR,
O. F. Kondratsova, and N. P. Smirnov.
Soviet Hydrology, Selected Papers No 2, p 182-192, 1973. 7 fig, 3 tab, 28 ref. Translated from News of the All-Union Geographic Society (Izvestiya VGO), No 2, p 149-160, 1973.

Descriptors: *Streamflow, *Hydrology, *Regional analysis, Frequency analysis, Natural flow, Runoff, Average flow, Time series analysis, Discharge(Water), Meteorology, Hydrologic aspects, Hydrologic data, Frequency, Statistical methods.
Identifiers: *USSR, Quasi-biennial streamflow variation.

Data on mean monthly discharges at 35 gaging stations on 16 rivers in the European USSR, 6 rivers in Central Asia, and 13 rivers in Siberia were analyzed. The length of observation record was 32 years, except for three Siberian rivers, where the record was 5-7 years shorter, and gaging stations in the Volga basin for which the series analyzed dated back to 1908. Atmospheric circulation was also analyzed. Streamflow fluctuations in the USSR during the period from 1931 to 1962 revealed a variation with a period of about 25-30 months everywhere, except in some rivers of East Siberia. The contribution of this variation to general runoff fluctuations over the period in question averages from 1/5 to 1/4 of its value. The role of the 2-year cycle in general streamflow fluctuations increased in some periods and was insignificant in others. The general patterns of the quasi-biennial streamflow cycle in the USSR were determined by the characteristics of variation of the pressure field that depend on the stratospheric cycle. Periods of easterly flow in the equatorial stratosphere corresponded to an increase in runoff over most of the European USSR and in the northern regions of East Siberia, and to a decrease in runoff in the extreme southeast of the European USSR, in Central Asia, and in the southern parts of West and East Siberia. The opposite picture in runoff distribution over the USSR is observed in periods of westerly stratospheric flow in the equatorial region. (Humphreys-ISWS)
W74-13011

SIMULATION OF RAINFALL SEQUENCES,
Auckland Univ. (New Zealand).
For primary bibliographic entry see Field 2B.
W74-13013

ESTIMATION OF AREA AND CIRCUMFERENCE OF SMALL WETLANDS,
Canadian Wildlife Service, Saskatoon (Saskatchewan).
J. B. Millar.
J Wildl Manage. Vol 37, No 1, p 30-38, 1973. Illus.

Descriptors: *Wetlands, Areal, Dimensions, Size.
Identifiers: Circumference.

Maximum contour length and width measurements were used in formulas for the area and circumference of an ellipse to estimate the area and circumference of 441 individual contours from 71 wetland basins. Contours were measured from maps, first, as single ellipses and, secondly, as either single or multiple ellipses depending upon their irregularity in shape. The latter method produced calculated values for simple and multielliptical contours which, on the average, deviated from actual values by +3.7 and +3.1%, respectively, for area and -2.3 and -0.3%, respectively, for circumference. Circumference per acre derived from calculated area and circumference values had mean deviations of -5.7 and -3.0%, respectively. Ninety-five percent of all calculated values were within 13% of actual values. Methods are suggested for using the technique in the field. (See also W72-05481)--Copyright 1973, Biological Abstracts, Inc.
W74-13033

SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
For primary bibliographic entry see Field 2B.
W74-13052

THE MATHEMATICAL MODELING OF SOIL-WATER-NITROGEN PHENOMENA,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-13138

ARIZONA CLIMATE, 1931-1972.
For primary bibliographic entry see Field 2B.
W74-13139

DESERT ECOSYSTEMS: ENVIRONMENT AND PRODUCERS,
Hebrew Univ., Jersualem (Israel). Dept. of Botany.
I. Noy-Meir.
Annual Review of Ecology and Systematics, Vol 4, p 25-51, 1973. 4 fig, 119 ref.

Descriptors: *Ecosystems, *Deserts, *Model studies, Arid lands, Rainfall, Sptial distribution, Water balance, Desert plants, Arid climate, Infiltration, Runoff, Storage capacity, Drainage, Transpiration, Evaporation, Biomass, Salinity, Soil water, Stochastic processes, Energy conversion.

An examination of knowledge on structure and functions of desert ecosystems was made, particularly of those distinctly characteristic of arid ecosystems which are defined as water controlled...with infrequent, discrete, and largely unpredictable inputs. The possibility of using common characteristics for systems analysis and simulation modelling was also investigated. (Mastic-Arizona)
W74-13150

ECOLOGICAL SURVEY OF THE VENEZUELAN WESTERN LLANOS: I. THE REGIONAL ECOLOGICAL UNITS, (IN SPANISH),
Universidad de Los Andes, Merida (Venezuela). Facultad de Ciencias.

For primary bibliographic entry see Field 6G.
W74-13355

2B. Precipitation

STRUCTURE AND MECHANISM OF PRECIPITATION AND THE EFFECT OF OROGRAPHY IN A WINTERTIME WARM SECTOR,
Royal Radar Establishment, Malvern (England). Meteorological Office Research Unit.
K. A. Browning, F. F. Hill, and C. W. Pardoe.
Quarterly Journal of the Royal Meteorological Society, Vol 100, p 309-330, July 1974. 12 fig, 1 tab, 25 ref.

Descriptors: *Precipitation intensity, *Storm structure, *Synoptic analysis, Radar, Radiosondes, Rain gages, Precipitation(Atmospheric), Orography, Winter, Rainfall, Hills.
Identifiers: *Warm sector precipitation, Potential instability, Orographic precipitation, Wales, England, British Isles.

A case study was presented showing the three-dimensional structure and evolution of precipitation upwind, over, and downwind of the south Wales hills during the passage of a wintertime warm sector that gave rather heavy and prolonged rainfall. The precipitation structure was synthesized from a network of weather radars and autographic raingauges. The stucture was interpreted within a dynamical framework derived from routine upper air soundings supplemented by serial ascents upwind and downwind of the hills. The warm sector was characterized by a fast-moving airstream with potential instability, not only at low levels due to its passage over a warm sea, but also in the middle troposphere. The middle-level potential instability was due to differential thermal advection in an intense and nearly vertical baroclinic zone that extended ahead of the surface cold front at middle levels. Forecasting techniques that predict rainfall on the basis of forecast large-scale vertical ascent may fail to identify some important situations of orographic warm sector rain unless the interaction of potential instability and orography is realistically taken into account. (Jones-ISWS)
W74-12975

COMPARISON OF MEAN RAIN CATCH OF VARIOUS GAUGE NETWORKS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wassertau, Hydrologie und Glaziologie.
B. Sevruk.
Nordic Hydrology, Vol 5, p 50-63, 1974. 4 fig, 6 tab, 18 ref.

Descriptors: *Rain gauges, *Instrumentation, *Isohyetes, Networks, Precipitation gages, Winds, Wetting, Mountains, Slopes, Basins, Maps, Precipitation(Atmospheric), Rainfall.
Identifiers: *Rain gage comparison, *Stereo rain gages, Wind effects, Wetting errors, Mountain terrain.

After the substitution of stereo for horizontal orifices of rain gauges on open steep slopes, the mean network catch in a subbasin with prevailing windward exposure was increased by 11%. In a subbasin with leeward exposure it was increased by only 4%. The mean network catch of ground level stereo gauges corrected for wetting losses was about 17% greater than that of elevated gauges with horizontal orifices. There was little difference between the mean network catch of ground level stereo gauges in the two subbasins. The isohyetal map from the data of these gauges was less complicated than the map drawn from the data of elevated gauges with horizontal orifices in the same subbasin. (Jones-ISWS)
W74-12976

A PROCESSING SYSTEM FOR FISCHER AND PORTER PRECIPITATION GAUGE DATA,
Atmospheric Environment Service, Downsview (Ontario).
For primary bibliographic entry see Field 7C.
W74-12977

RAINFALL FREQUENCY VALUES FOR KENTUCKY.
Dept. of Natural Resources, Kentucky. Div. of Water.
For primary bibliographic entry see Field 7C.
W74-12979

REMOTE SENSING OF THE MOISTURE CONTENT OF THE ATMOSPHERE AND UNDERLYING SURFACE,
For primary bibliographic entry see Field 7B.
W74-12982

ONE-DAY EXTREME RAINFALL STATISTICS FOR THE PRAIRIE PROVINCES,
Atmospheric Environment Service, Downsview (Ontario).
D. M. Pollock, and G. J. Gaye.
Publication No CLI-5-73, 1973. 26 p, 21 fig, 1 tab, 18 ref.

Descriptors: *Rainfall, *Excessive precipitation, *Statistics, Probability, *Canada, Maps, Precipitation.
Identifiers: *Gumbel method, *Extreme rainfall statistics, Manitoba, Saskatchewan, Alberta, Prairie provinces.

Maps are presented giving the one-day extreme rainfalls for the Prairie Provinces with return periods of 2, 5, 10, 25 and 100 years calculated by the Gumbel method. In addition, maps are presented giving the mean and standard deviation of the annual series of maximum one-day rainfalls. These maps are based on all available data prior to 1972 from 1061 stations in the Prairie Provinces equipped with standard, nonrecording rain gauges. The general pattern was for the heaviest rainfalls to occur in southwestern Manitoba and along the foothills of the Rocky Mountains in Alberta, while the smallest extreme rainfalls occurred in the northern regions. (Jones-ISWS)
W74-13000

THE ACCURACY OF RADAR-DERIVED RAINFALL MEASUREMENTS IN HILLY TERRAIN,
British Meteorological Office, Bracknell (England).
T. W. Harrold, E. J. English, and C. A. Nicholass.
Quarterly Journal of the Royal Meteorological Society, Vol 100, p 331-350, 1974. 7 fig, 6 tab, 13 ref.

Descriptors: *Radar, *Rain gages, *Rainfall, Instrumentation, Measurement, Reliability, Wind, Hydrology, Meteorology, Sampling, Meteorological data.
Identifiers: *Radar-rainfall relationships, *Accuracy of radar measurement, Raingage density, Wales, River Dee(Wales), Hilly terrain, Areal rainfall.

A weather radar was used to measure rainfall over hilly terrain in north Wales. The radar was a standard Plessey Type-43S, which had a wavelength of 10 cm and a beam width to half power points of 2 degrees. Measurements were compared with those based on a raingauge network consisting of 62 tipping bucket gauges distributed over 1000 sq km. Errors in the radar estimates were excessive unless the radar was calibrated hourly using raingauge measurements from one site. The accuracy was further increased when the horizontal drift of the rain in the wind between the radar beam and the calibration site was allowed for. The main causes of error in the radar measurements seemed to be: (1) variations in the drop size distribution relations; (2) the spatial variation in the growth (or evaporation) which occurred between the beam and the ground; and (3) the horizontal drift of the rain in the wind. Probably all of these factors, but in particular the second item, were more important in the hilly terrain than would be the case in flatter terrain. The mean percentage differences between the radar estimates and optimum estimates of rainfall for varying distances, time periods, and areal sizes were given. (Schickedanz-ISWS)
W74-13009

SIMULATION OF RAINFALL SEQUENCES,
Auckland Univ. (New Zealand).
A. J. Raudkivi, and N. Lawgun.
Journal of Hydrology, Vol 22, No 3-4, p 271-294, 1974. 8 fig, 7 tab, 7 ref.

Descriptors: *Simulated rainfall, *Statistical methods, *Rainfall disposition, *Analytical techniques, Markov processes, Time series analysis, Spatial distribution, Correlation analysis, Sampling.
Identifiers: *Rainfall duration, *Rainfall interval, Pearsonian III distribution, Frequency distribution.

A stochastic model for the generation of rainfall sequences based on 10-minute time units was developed. The time series contained deterministic and stochastic components, and was modeled as a first- or second-order Markov process. The parameters for the deterministic component were obtained by correlation and regression analyses. The random component was approximated by a Pearsonian III distribution. The observed rainfall sequences were assumed to form a homogeneous and stationary time series for any particular month of the year. The basic variables in the stochastic rainfall model were the amount of rainfall, the duration of rainfall, and the interval between two successive rainfalls. It was inferred from rainfall data at three climatologically different locations that the interval length could be assumed independent of the amount and duration of rainfall. However, a strong correlation was indicated between the amount and duration of rainfall. The proposed stochastic model was used to generate rainfall at intervals sampled from the observed cumulative distribution of the intervals. The means and standard deviations of generated rainfalls were in good agreement with the corresponding values from the observed rainfalls. (Singh-ISWS)
W74-13013

SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
J. C. McWhorter.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-236 419, $3.75 paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, July 1974. 36 p, 22 fig, 5 tab, 6 ref, append. OWRT A-075-MISS(1).

Descriptors: *Droughts, Water balance, Statistics, *Mississippi, *Climatic data, *Frequency, Distribution *Regression analysis, Monthly.
Identifiers: *Drought severity, Drought frequency.

The objectives of the study were to determine drought periods and classify their severity for ten geographic areas in the state of Mississippi, and to analyze the severity data in order to determine the return period associated with a specific degree of severity. These objectives were accomplished by using monthly climatological data for Mississippi and a drought model which expressed monthly severity in terms of an index value. These values were determined for ten districts in Mississippi for each month of the period 1899-1970. Findings are expressed in graphical form and depict duration and severity of drought, distributions, and recur-

rence intervals. The severity data were treated as an annual series and fitted to an equation of the form Y = a + b log X, where Y = severity index and X = return period in years, using a least-squares regression procedure. The coefficients of determination, R-square, were in the range 0.88 - 0.96 for the ten districts. For all districts, a severity index value of -1.9 (mixed drought) can be expected to be equaled or exceeded in 2 years; -2.8 (moderate drought), in 5 years; -3.6 (severe drought), in 10 years; and -4.5 (extreme drought), in 25 years.
W74-13052

ARIZONA CLIMATE, 1931-1972.
University of Arizona Press, Tucson, Revised, Second edition, 1974. W. D. Sellers and R. H. Hill, editors. 616p. 15 fig, 7 tab, 52 ref.

Descriptors: *Climatic data, *Arizona, *Precipitation(Atmospheric), *Weather data, Humidity, Clouds, Winds, Average, Seasonal, Evaporation.

A revision of the 1964 edition of Arizona climate uses complete climatic summary data furnished by approximately 1,000 cooperating weather observers throughout the state for 150 sites, and abbreviated summaries for 183 more. Coverage is for 1931 through 1972, although averages are computed only for the 30-year period 1941-1970, consistent with National Weather Service practice of recomputing 30-year normals every 10 years. A summary of outstanding weather events in Arizona, 1963-1973, is included, along with descriptions of the State's physical features, precipitation, temperature, relative humidity and the temperature-humidity index, surface winds, cloudiness, and evaporation. Typical information on stations includes means and extremes for temperature: month, daily minimum and maximum, monthly average, highest and lowest records with years. For precipitation, data include: mean, total, greatest daily with year, maximum monthly with year. There is a column on estimated mean relative humidity. For most stations, there are comprehensive descriptions of the climate prevailing in those particular locales. Tabulated station histories, 1931-1972, give coordinates, elevation, distance and direction from post office, observer, dates, and other information. (Paylore-Arizona)
W74-13139

EXPERIMENTS SUPPORTING A PROGRAM OF WARM FOG DISPERSAL BY ELECTRICAL CHARGE INJECTION,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 3B.
W74-13216

SEASONAL EFFECTS IN FLOOD SYNTHESIS,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W74-13298

AVAILABLE SOIL WATER: TIME-DISTRIBUTION IN A WARM SEASON RANGELAND,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 2G.
W74-13403

A DEWPOINT HYGROMETER FOR WATER POTENTIAL MEASUREMENT,
Wescor, Inc., Logan, Utah.
For primary bibliographic entry see Field 7B.
W74-13407

POTENTIAL PASTURE PRODUCTION IN THE UPLANDS OF WALES: I. CLIMATIC VARIATION,
Welsh Plant Breeding Station. Agricultural Research Council, Aberystwyth(Wales).
For primary bibliographic entry see Field 3F.
W74-13454

2C. Snow, Ice, and Frost

THE INFLUENCE OF WATER TRANSPORT AND TRANSFER OF HEAT BY FREEZING AND DEFROSTING ON SOIL GENESIS,
Akademiya Nauk SSSR, Moscow. Institut Agrokhimii i Pochvovedeniya.
For primary bibliographic entry see Field 2G.
W74-12852

AN IMPROVED SNOW STUDY KIT,
Maine Cooperative Fishery Unit, Orono.
For primary bibliographic entry see Field 7B.
W74-12967

FORECASTING DISCHARGE FROM A GLACIATED BASIN IN THE SWISS ALPS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
H. Jensen, and H. Lang.
International Association for Scientific Hydrology, Gentbrugge, Belgium, Publication No 107, p 1047-1054, 1973. 3 fig, 7 ref.

Descriptors: *Glaciohydrology, *Water sources, *Runoff forecasting, *Ablation, Runoff, Discharge(Water), Glaciers, Melting, Climatology, Air temperature, Precipitation(Atmospheric), Solar radiation, Vapor pressure, Daily hydrographs, Hydrology, Snow, Ice, Melt water.
Identifiers: *Switzerland, Glaciation basins, Swiss Alps, Pennine Alps(Valais).

The runoff from a glaciated region in the catchment area of a hydroelectric power plant was studied with regard to shortrange forecasts of the discharge. The forecasts were based on regression equations employing the following predictors: discharge, air temperature, precipitation, global radiation, and vapor pressure. The process was not stationary because the hydrological conditions vary in the course of the ablation season. This was taken into account by subdividing the melt season into three intervals by physical criteria and by considering the residuals of preliminary regression equations. Each of the final equations was valid only in one interval. (Humphreys-ISWS)
W74-12974

CLASSIFICATION AND VARIATION OF SEA ICE RIDGING IN THE WESTERN ARCTIC BASIN,
Cold Regions Research and Engineering Lab., Hanover, N.H.
W. D. Hibler, III., S. J. Mock, and W. B. Tucker, III.
Journal of Geophysical Research, Vol 79, No 18, p 2735-2743, June 20, 1974. 5 fig, 5 tab, 18 ref, append. DA Project, 4A161102B52E.

Descriptors: *Sea ice, *Mathematical models, *Arctic Ocean, Distribution patterns, Profiles, Surfaces, Regression analysis, Evaluation, Basins, Temporal distribution, Spatial distribution, Frequency analysis.
Identifiers: *Arctic Basin(Western area), *One-parameter model, Sea ice ridging, Ridge height.

A one-parameter model for pressure ridges was developed and compared, with good agreement, with over 3000 km of laser profile data taken from November 1970 to February 1973 in the Arctic basin. Comparisons were also made with a previously developed two-parameter model. The number of ridges per kilometer at any height level may be well predicted from the one-parameter model by using a parameter called ridging intensity which may be determined for a region from the mean number of ridges per unit length and the mean ridge height. Regional and temporal variations in ridging intensity in the western Arctic basin were studied. Results indicated that although magnitudes of ridging intensity vary in time, the relative regional variations were similar. Consequently, three distinct regions of ridging intensity having relatively stable boundaries can be defined. Annual variation in new ice production due to ridging was sufficiently large to suggest that ridging plays an important role in the overall mass balance of the Arctic basin. (Humphreys-ISWS)
W74-12991

ICEBREAKING BY TOW ON THE MISSISSIPPI RIVER,
Cold Regions Research and Engineering Lab., Hanover, N.H.
G. D. Ashton, S. L. DenHartog, and B. Hanamoto.
Available from NTIS, Springfield, Va. 22161 as AD-768 169, Price $4.25 printed copy, $2.25 microfiche. Special Report No 192, August 1973. 72 p, 59 fig, 11 tab, 5 ref, 3 append. ED-24-72-R1, R2, and R3.

Descriptors: *Ice cover, *Icejams, *Mississippi River, *Navigation, Transportation, Measurement.
Identifiers: *Icebreaking, *River ice.

A field investigation of icebreaking on the Mississippi River between Alton, Illinois, and Fort Madison, Iowa, encountered a wide variety of ice conditions and was performed with a variety of barge configurations and arrangements. Qualitative observations of the nature and difficulties encountered while icebreaking are given. By instrumenting the propeller shafts and using load cells between the towboat and the barges, quantitative information was obtained on the resistance encountered while icebreaking. The effects of repeated passage through an ice cover, navigation procedures peculiar to icebreaking, and minor damage sustained by the towboat are described. (Knapp-USGS)
W74-13170

EXPERIMENTAL DEVELOPMENT OF POTABLE WATER SUPPLY FOR NEW SOUTH POLE STATION,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 4B.
W74-13197

ICE PROJECT-ICE CRYSTAL INHIBITION-AN APPLICATIONS PROGRAM OF CHEMICAL DISPERSAL IN SMALL CUMULUS CLOUDS,
Atmospherics, Inc., Fresno, Calif.
For primary bibliographic entry see Field 3B.
W74-13212

RECONNAISSANCE LIMNOLOGY OF SUB-ANTARCTIC ISLANDS: I. CHEMISTRY OF LAKE WATERS FROM MACQUARIE ISLAND AND THE ISLES KERGUELEN,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 2H.
W74-13389

2D. Evaporation and Transpiration

TRANSPORT PHENOMENA CONTROLLING EVAPORATION FROM SOIL,
Department of Agriculture, Ottawa (Ontario). Soil Research Inst.
W. J. Staple.

n: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research nd International Society of Soil Science Joint ub, Vol II, p 566-573, 1972. 5 fig, 10 ref.

escriptors: *Evaporation, *Air-earth interfaces, Soil water movement, Hydraulic conductivity, ysteresis, Wetting, Drying, Soil moisture.

aboratory tests were made involving combinaons of three depths of infiltration and four initial eriods of redistribution. Evaporation losses from oil columns could be predicted in terms of physil data provided that the hydraulic conductivity ear the surface was reduced relative to that of the ulk sample. The change in K was caused by enapped air and swelling or heaving of the unconned surface during rapid infiltration. The experients were conducted without direct radiation but e potential evaporation was increased for five ours each day by means of a fan. The isothermal odel was assumed in the computations. (See also 74-12811) (Knapp-USGS)
74-12845

FFECT OF SOIL SALINITY ON THE RATE OF VAPORATION,
aghdad Univ. (Iraq). Coll. of Agriculture.
or primary bibliographic entry see Field 2G.
74-12846

ELATIONSHIP BETWEEN THE HYDROLOY, FLUID CHEMISTRY AND DIAGENETIC INERAL FORMATION IN THE COASTAL REAS OF THE PERSIAN GULF,
ntario Water Resources Commission, Ottawa.
or primary bibliographic entry see Field 2L.
74-12851

OMPARISONS OF MEASURED AND ESTIATED DAILY POTENTIAL EVAPOTRANSIRATION IN A HUMID REGION,
gricultural Research Service, University Park, a. Northeast Watershed Research Center.
. H. Parmele, and J. L. McGuinness.
ournal of Hydrology, Vol 22, No 3-4, p 239-251, 974. 4 tab, 26 ref.

escriptors: *Evapotranspiration, *Transpiration, otential flow, Lysimeters, Energy budget, eteorological data, Climatic data, Precipitaon(Atmospheric).
lentifiers: *Net radiation, *Potential evapotransration, Coshocton(Ohio), Regression statistics.

arious meteorological methods for computing ily potential evapotranspiration (PET) were sed during the summers of 1968 and 1969 with ily totals of continuous micrometeorological easurements made over one of the monolith simeters at Coshocton, Ohio. The results of daily otential ET calculations and the general agreeent of these estimates with lysimeter values of T indicated that evapotranspiration from corn id clover crops was at potential condition during e periods of observation. Estimates of PET ade with various versions of the combination uation that utilized measured net or solar radiaon were superior to estimates made with the her methods tested. A daily value of net radiaon was a good measure of evapotranspiration hen conditons were at potential. In one version the combination equation, 'true' crop roughness arameters were utilized, which gave a good fit for e clover data but an over-predicted potential ET r corn by 44%. A modified combination equation eveloped at Coshocton, Ohio for predicting acal ET was tested with data independent of that sed in the derivation. The successful application this equation, be used to estimate daily ET in e humid northeastern United States from cliatic data. (Roberts-ISWS)
74-12988

EVAPOTRANSPIRATION OF WATER HYACINTH (EICHHORNIA CRASSIPES),
Landbouwproefstation, Paramaribo (Surinam).
R. Van Der Weert, and G. E. Kamerling.
Journal of Hydrology, Vol 22, No 3-4, p 201-212, 1974. 6 fig, 2 tab, 16 ref.

Descriptors: *Water hyacinth, *Evapotranspiration, Evaporation, Water consumption, Water loss, Solar radiation, Transpiration, Evaporation pans, Consumptive use, Energy budget, South America.
Identifiers: *Surinam(Paramaribo), *Surinam(Brokopondo Lake), Free water evaporation, Water blooms.

Water balance measurements made near the Agricultural Experiment Station at Paramaribo and on the Brokopondo Lake, located on the northeast coast of South America, showed that the evapotranspiration of water hyacinth appeared to be respectively 48% and 44% higher than free water evaporation. These values were much lower than expected based upon values given in previous literature. This discrepancy was explained to a large extent by border effects in the experiments cited. Calculations with a Penman-type formula, in which the crop characteristics were estimated from the Brokopondo Lake data, showed that the ratio between evapotranspiration and free water evaporation decreases with increasing amounts of solar energy and increases with increasing vapor pressure deficits. (Roberts-ISWS)
W74-12998

WATER BUDGET ESTIMATION IN BELLARY REGION,
Indian Council of Agricultural Research, Bellary. Southern Regional Soil Conservation Research Sub-Station.
N. S. Jayoram, B. Ramanath, and B. Verma.
Annals of Arid Zone, Vol 12, No 1 and 2, p 51-58, March and June, 1973. 1 fig, 3 tab, 9 ref.

Descriptors: *Hydrologic budget, *Moisture deficit, *Evapotranspiration, *Irrigation water, Precipitation(Atmospheric), Soils, Soilwater, Bulk density, Field capacity, Root zone, Wilting point, Meteorological data, Runoff, Percolation, Seepage, Drought, Arid climates.
Identifiers: *Penman's equation, *India(Bellary region).

A water budget was formulated using Penman's equation to compute potential evapotranspiration in the Bellary Region. Certain meteorological parameters such as air temperature, relative humidity, radiation, and wind velocity were used to compute the potential evapotranspiration. This project was undertaken to determine the optimum plan for utilization of irrigation water. Results showed a mean deficit of 136.92 centimeters annually over a ten-year period from 1957-58 to 1967-68. Annual precipitation was found to supply approximately two-sevenths of the total requirements of the Bellary Region. (Mastic-Arizona)
W74-13145

ROLE OF CLASS A PAN IN ESTIMATING NATURAL EVAPORATION AND EVAPOTRANSPIRATION,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
M. S. Kettaneh, N. A. Zaki, and G. F. Kaka.
Technical Bulletin 67, August 1974. 12 p, 1 fig, 3 tab, 10 ref.

Descriptors: *Evaporation pans, *Evapotranspiration, Evaporimeters, Meterological data, Irrigation, Temperature, Precipitation(Atmospheric).
Identifiers: *Penmsn's formula, 'Kohler's coaxial technique, *Drag.

Pan-coefficients have been worked out for potential evapotranspiration, free water surface evaporation, and shallow lakes evaporation on a monthly basis, and for the year July 1969 to June 1970 as a whole. A modified Penman's formula was used to compute the first two coefficients, and Kohler's coaxial technique was used for the third coefficient. All were computed from meterological data including temperatures, precipitation, radiation and air moisture data. Results may be used to simulate, as realistically as possible, conditions that occur in agriculture, irrigation, and hydrology. (Mastic-Arizona)
W74-13153

TRANSPIRATION INTENSITY AND PRODUCTIVITY OF WILD AND CULTIVATED MEADOW PLANTS IN SOUTHWESTERN KYZYLKUM, (IN RUSSIAN),
D. A. Maisarov.
Uzb Biol Zh. Vol 16, No 4, p 31-33, 1972.
Identifiers: Kyzylkum, Meadows, *Transpiration.

The study showed varying productivity of wild and cultivated meadow plants under identical moisture conditions. A 4-fold increase in fodder grass production may be obtained by selecting species which optimally utilize moisture.--Copyright 1973, Biological Abstracts, Inc.
W74-13246

THE INFLUENCE OF AGROTECHNICAL FACTORS ON THE EVAPOTRANSPIRATION OF RICE, (IN HUNGARIAN),
University of Agriculture, Godollo (Hungary). Dept. of Crop Production and Soil Cultivation.
V. K. Vamadevan.
Acta Agron Acad Sci Hung. Vol 22, No 1/2, p 137-142. 1973.
Identifiers: Nitrogen, Rice, *Evapotranspiration.

Two water depths, each with 2 N levels and 2 plant populations were compared during 2 rice growing seasons as to their influence on the ET evapotranspiration of rice. ET was measured by embedding galvanized iron tanks in the rice field. An increase in the water depth caused significant increase in ET during the early period of growth. In the later period, there was no difference. ET was significantly different at the 2 levels of plant population at both water depths. The effect of N levels on ET was not consistent. However, the trend was that high N levels increased the ET at a 5-cm water depth. The opposite was true at a 20-cm water depth.--Copyright 1973, Biological Abstracts, Inc.
W74-13255

THE RELATIONSHIP BETWEEN RICE EVAPOTRANSPIRATION AND DRY MATTER PRODUCTION, (IN HUNGARIAN),
University of Agriculture, Godollo (Hungary). Dept. of Crop Production and Soil Cultivation.
V. K. Vamadevan.
Acta Agron Acad Sci Hung. Vol 22, No 1/2, p 175-179. 1973, Illus.
Identifiers: Nitrogen, Rice, *Evapotranspiration.

The water use efficiency was increased at high plant density levels at the 5- and 20-cm water depths. The N levels and water depths did not influence efficiency. The yield ET evapotranspiration relationship gave a linear increase in water use efficiency with increasing yield.--Copyright 1973, Biological Abstracts, Inc.
W74-13257

SOME REMARKS CONCERNING THE ACTION OF IAA ON TRANSPIRATION EXAMINED AT THE FIRST VEGETATIVE STAGE OF TRITICUM DURUM VAR. OUED ZENATI 368, (IN POLISH),
Instytut Hodowli i Aklimatyzacji Roslin, Warsaw (Poland). Zaklad Biofizyki Roslin.
W. Nowakowski.
Bull Acad Pol Sci Ber Scz Biol. Vol 21, No 2, p 165-169. 1973, English summary.

Identifiers: IAA, *Transpiration, Triticum-Durum, Wheat.

The effects of IAA on transpiration and on water content in leaves and stalks of 10- and 20-days seedlings of T. durum cv. Oued Zenati were investigated. The wet and dry weights of the leaves, stems and roots of the wheat were determined. The experiment was made under laboratory conditions in crystallizers containing 500 g of red soil. Thirty, 40 and 60% of capillary soil capacity was maintained during the experiment. IAA during drought (30% capillary soil capacity) lowered the transpiration coefficient, and dry weight of the plants slightly increased.--Copyright 1973, Biological Abstracts, Inc.
W74-13259

THE WATER REGIME OF FLOWERS, (IN RUSSIAN),
Ryazanskii Gosudarstvennyi Pedagogicheskii Institut (USSR).
N. I. Antipov.
Bot Zh, Vol 57, No 10, p 1327-1332, 1973, Illus.
Identifiers: *Flowers, *Transpiration, Water supply.

The petals of some flowers have a higher water content and transpiration rate than leaves. A good water supply is needed during the blooming period.--Copyright 1973, Biological Abstracts, Inc.
W74-13381

CONTRIBUTIONS TO THE WATER RELATIONS OF OLIVE UNDER SEMI-ARID CONDITIONS,
Ain Shams Univ., Cairo (Egypt). Dept. of Botany.
A. A. El-Rahman, E. Abd, H. Nadia, and A. H. Hassan.
Flora (Jena), Vol 162, No 1/2, p 99-107, 1973, Illus.
Identifiers: *Arid climates, *Transpiration, Leave, *Olive trees, Stomata.

This study aimed to show how much microclimatic condtions, leaf age and moisture stress affect the transpiration intensity and stomatal movement in olive trees. The top leaves exposed to sun and air currents for a longer period during the day exhibited a relatively high transpiration intensity, whereas leaves in the center which were shaded and protected from air currents showed the lowest transpiration intensity associated with the narrowest stomatal opening. East-facing leaves had maximum transpiration rates in the forenoon, whereas west-facing ones exhibited maximum transpiration in the afternoon. Stomatal movement showed the same trend as transpiration rate. Yound leaves had lower transpiration intensity and narrower stomatal apertures than mature leaves. Transpiration intensity was markedly suppressed in trees subjected to adverse moisture conditions. Sampling to estimate, the water output of a tree should include leaves from different parts of the tree and of different ages.--Copyright 1973, Biological Abstracts, Inc.
W74-13382

ESTIMATING SOLAR RADIATION ON MOUNTAIN SLOPES,
Forest Service, (USDA), Franklin, N.C. Southeastern Forest Experiment Station.
L. W. Swift, Jr., and K. R. Knoerr.
Agricultural Meteorology, Vol 12, No 3, p 329-336, December 1973. 3 fig, 1 tab, 27 ref.

Descriptors: *Solar radiation, *Slopes, *Estimating equations, Model studies, Mountains, Clouds, Climatic data, *North Carolina.
Identifiers: Atmospheric transmission.

The amount of solar irradiation on a mountain slope is an important parameter for describing the climatology of a sloping site, but measurements of such radiation are not easily obtained. Daily totals of solar irradiation can be estimated by using published tables of potential solar irradiation if the effects of atmospheric transmissivity and cloud cover are included. Daily totals of solar irradiation on the slope were estimated as the product of the ratio of potential solar irradiation for the slope to the potential for a horizontal surface times the daily total of global solar radiation measured on a horizontal surface at a site near enough to have the same cloud cover as the mountain slope. A test of this method shows that valid estimates of solar radiation input were obrained for two opposite-facing slopes.
W74-13415

PHOTOSYNTHESIS, DIFFUSION RESISTANCE AND RELATIVE PLANT WATER CONTENT OF COTTON AS INFLUENCED BY INDUCED WATER STRESS,
Agricultural Research Service, Mandan, N. Dak. Northern Great Plains Research Center.
For primary bibliographic entry see Field 3F.
W74-13457

EFFECTS OF LOW SOIL TEMPERATURE ON TRANSPIRATION, PHOTOSYNTHESIS, LEAF RELATIVE WATER CONTENT, AND GROWTH AMONG ELEVATIONALLY DIVERSE PLANT POPULATIONS,
J. E. Anderson, and S. J. McNaughton.
Ecology, Vol 54, No 6, p 1220-1233, 1973, Illus.

Descriptors: *Transpiration, *Photosynthesis, Growth rates, *Soil temperature, *Moisture content, Leaves, Roots.

The effects of low soil temperature on photosynthesis and water relations were examined in 17 populations of 12 vascular plant species (Achillea borealis, Horkelia fusca, Salix scouleriana, Solidago spathulata, Mimulus cardinalis, Agropyron spicatum, Geum triflorum Salix sp., Achillea millefolium, G. rivale, Salix eastwoodiae, Solidago multiradiata) from native elevations ranging between 10 m and 3170 m. Root permeability to water was sufficient in the majority of populations studied so that neither transpiration nor net photosynthesis was reduced at 3C soil temperature compared to the rates at 20C soil temperature. There was no evidence of differential natural selection along altitudinal gradients for ability to maintain photosynthetic rate when roots were chilled. Leaf relative water content was typically reduced in response to soil cooling. There is a critical relative water content above which both transpiration and photosynthesis are insensitive to water content reductions. Root chilling failed to reduce relative water content below this level in most populations studied. Low soil temperatures which had no adverse effects on transpiration or photosynthesis were found to significantly retard plant growth. The observed relative water content reductions might limit growth despite their failure to affect photosynthesis. Evidence for natural selection for ability to maintain turgor upon root chilling in high elevation populations was provided by an inverse relationship between the magnitude of depression in relative water content and native elevation. Growth reduction at low soil temperatures must result from impaired turgur, decreased root growth and metabolism or impaired cytokinin synthesis and translocation rather than direct limitation of carbon assimilation.--Copyright 1974, Biological Abstracts, Inc.
W74-13492

2E. Streamflow and Runoff

THE CHEMICAL COMPOSITION AND FLOW OF THE RIVER FROME AND ITS MAIN TRIBUTARIES,
Freshwater Biological Association, Wareham (England). River Lab.
For primary bibliographic entry see Field 2K.
W74-12928

FORECASTING DISCHARGE FROM A GLACIATED BASIN IN THE SWISS ALPS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 2C.
W74-12974

SPATIAL PATTERNS OF LONG-PERIOD STREAMFLOW FLUCTUATIONS IN THE EUROPEAN USSR,
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 2A.
W74-12981

ERRORS OF AERIAL SURVEY OPERATIONS AND OFFICE PROCESSING OF DATA IN AIRCRAFT MEASUREMENTS OF DISCHARGES,
For primary bibliographic entry see Field 7C.
W74-12986

THREE-DIMENSIONAL STRUCTURE OF STORM-GENERATED CURRENTS,
Shell Development Co., Houston, Tex.
For primary bibliographic entry see Field 2L.
W74-12992

MODELLING OF SURFACE RUNOFF SYSTEMS BY AN ARMA MODEL,
Indian Inst. of Tech., New Delhi. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-12993

PROBABILITY DISTRIBUTION OF OUTFLOW FROM A LINEAR RESERVOIR,
Department of the Environment, Ottawa (Ontario). Hydrology Research Div.
For primary bibliographic entry see Field 4A.
W74-13001

STATE VARIABLE MODEL OF OVERLAND FLOW,
Alberta Dept. of Environment, Edmonton. Div. of Technical Services.
For primary bibliographic entry see Field 2A.
W74-13008

QUASI-BIENNIAL STREAMFLOW VARIATION IN THE USSR,
For primary bibliographic entry see Field 2A.
W74-13011

HYDROLOGY AND WATER RESOURCES OF THE DEERFIELD RIVER BASIN, MASSACHUSETTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13016

ANALYSIS OF URBAN LAND TREATMENT MEASURES FOR FLOOD PEAK REDUCTION,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-13043

UNIT STREAM POWER FOR SEDIMENT TRANSPORT IN NATURAL WATERS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2J.
W74-13049

FLOOD OF JUNE 1964 IN THE OLDMAN AND MILK RIVER BASINS, ALBERTA,
Department of the Environment, Ottawa, (Ontario). Inland Waters Directorate.

L. A. Warner.
Technical Bulletin No 73, 1973. 89 p, 35 fig, 13 photo, 4 tab, 6 ref, 2 append.

Descriptors: *Floods, *Historic floods, *Canada, *Montana, Peak discharge, Flood frequency, Flood data, Depth-area-duration analysis, Meteorology, Rainfall-runoff relationships, Meteorological data.
Identifiers: *Oldman River(Alberta), *Milk River(Alberta).

Severe flooding occurred in June 1964 as a result of historical maximum peak discharges in the headwaters of many streams in Montana and Southwestern Alberta. The flooding was caused by a storm that extended along the foothills, parallel to the eastern slope of the Rocky Mountains, and 200 miles northward from Helena Mountain. In addition to the basic streamflow and other pertinent data, background information and some flood analysis are presented. A location map shows the area affected by the flood along with stream gaging, meteorological observation and snow course stations. The Upper South Saskatchewan and Milk River drainage basins and the flood of June 1964 are described. Flood frequency analyses are given for several of the hardest hit streams in the area. (Knapp-USGS)
W74-13173

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 4. HYDROGRAPH ANALYSIS,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
Available from NTIS, Springfield, Va 22161 as AD-774 261, Price $5.25 printed copy; $2.25 microfiche. Publication HEC-1HD-400, October 1973. 122 p, 24 ref.

Descriptors: *Hydrograph analysis, *Rainfall-runoff relationships, *International Hydrological Decade, Unit hydrographs, Snowmelt, Storm runoff, Runoff forecasting, Streamflow forecasting, Computer programs.

Practical techniques are given for analyzing precipitation, snowmelt, infiltration, and runoff processes as they relate to the computation of flood hydrographs. Topics discussed include: estimation of the areal depth and distribution of precipitation; calculation of runoff from snowmelt; determination of loss rates by linear and nonlinear functions; unit hydrograph theory and derivation; hydrograph reconstitution; and the estimation of unit hydrograph and loss rate coefficients for ungaged areas. Generalized computer programs are described for basin rainfall and snowmelt computations and unit hydrograph and loss rate optimization. (Knapp-USGS)
W74-13177

FLOODS OF JUNE 1972 IN THE HARRISBURG AREA, PENNSYLVANIA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13186

FLOOD OF MARCH 1968 ON THE NEPONSET RIVER, MASSACHUSETTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13187

FLOODS IN CAPRON QUADRANGLE, NORTHEASTERN ILLINOIS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13188

FLOODS IN GARDEN PRAIRIE QUADRANGLE, NORTHEASTERN ILLINOIS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13189

FLOODS IN HARVARD QUADRANGLE, NORTHEASTERN ILLINOIS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13190

FLOOD OF MARCH 1968 ON THE IPSWICH RIVER, MASSACHUSETTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13194

RIVER MILE INDEX--COLORADO RIVER MAIN STEM AND TRIBUTARIES (LEES FERRY, ARIZONA, EXCEPT SAN JUAN RIVER).
Bureau of Reclamation, Denver, Colo. Upper Colorado Regional Office.
Pacific Southwest Inter-Agency Committee Report of the Water Management Technical Subcommittee, September 1974. 85 p, 1 map.

Descriptors: *Colorado River, River systems, Colorado River Basin, Arizona, Colorado, Wyoming, Utah, New Mexico, Southwest U.S.
Identifiers: *River mile index.

This river mile index for the Colorado River and tributaries from Lees Ferry to the headwaters is one of a series of reports for stream basins in the Pacific Southwest. It includes the Colorado main stem above Lees Ferry, tributaries in Colorado, Green River main stem and the Duchesne and Yampa River basins. River mileages were determined from independent measurements made on U.S. Geological Survey topographic quadrangles. Information on stream-gage locations, drainage areas, and water elevations at key points were obtained from the U.S. Geological Survey. River mile distances were measured upstream from the mouth to the nearest tenth mile. Mile 0.0 for the Colorado River is at the Lees Ferry USGS gaging station; mile 0.0 for all other streams is at the centerline of the stream to which it is contributary. Streams and points of interest were based on the volume of flow, size of drainage, and degree of development. (Knapp-USGS)
W74-13196

FLOOD SURVEYS ALONG TAPS ROUTE, ALASKA,
Geological Survey, Anchorage, Alaska.
J. M. Childers.
Basic-Data Report, 1974. 16 p, 1 fig, 1 tab, 24 ref.

Descriptors: *Floods, *Alaska, *Pipelines, Peak discharge, Arctic, Stage-discharge relations, Flood data, Hydrologic data.
Identifiers: Trans-Alaska Pipeline.

Flood data and a description of flood surveys are presented for 24 sites along the Trans-Alaska Pipeline System(TAPS) route from Prudhoe Bay to Valdez. Twenty-four channel sites at or near the TAPS centerline were surveyed during 1971-73. Sites selected were reasonably straight, uniform, alluvial channel reaches of larger streams where the pipeline design was considered to be sensitive to flood magnitude. Driftwood and other flood-deposited vegetal debris upon the overbank floodways were used as floodmarks to determine elevations of Maximum Evident Flood surfaces at the channel sites. (Knapp-USGS)
W74-13198

FLOODS OF JUNE 1965 IN ARKANSAS RIVER BASIN, COLORADO, KANSAS, AND NEW MEXICO,
Geological Survey, Washington, D.C.
R. J. Snipes.
Available from GPO, Washington, DC 20402, Price $2.35 (paper copy). Water-Supply Paper 1850-D, 1974. 97 p, 15 fig, 2 plate, 3 tab, 21 ref.

Descriptors: *Floods, *Colorado, *Kansas, *New Mexico, *Historic floods, Water levels, Flood frequency, Flood recurrence interval, Flood data, Stage-discharge relations.
Identifiers: *Arkansas River basin.

Maximum discharges during the floods of June 1965 in the Arkansas River basin in Colorado, Kansas, and New Mexico were greater than those previously known at 49 of the 137 locations where flood information was obtained. Property damage exceeded $60 million, and 16 lives were lost. At many sites, peak discharges exceeded by several-fold the discharges that may be expected, on the average, once in 50 years; yet, the 1965 discharges could be exceeded in the near future. Heavy rainfall of more than 12 inches and as much as 18 inches caused severe flooding in the Arkansas River basin in Colorado and Kansas and the Canadian River basin in New Mexico. Snowmelt runoff added only small amounts to the flood peaks. The 1965 peak discharges along the main stem of the Arkansas River in Colorado were less than those in 1921, but tributary peaks were probably greater at many sites. In New Mexico the peak discharges exceeded those for the destructive floods of 1904 at some locations, by manyfold at some sites. Descriptions of the storms and floods, detailed streamflow records, and information on damages and flood frequency are compiled. (Knapp-USGS)
W74-13207

SEASONAL EFFECTS IN FLOOD SYNTHESIS,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W74-13298

A CONTINUUM MECHANICAL APPROACH TO THE FLOW EQUATIONS FOR MEMBRANE TRANSPORT: I. WATER FLOW,
Meharry Medical Coll., Nashville, Tenn. Div. of Biophysics and Neurobiology.
D. C. Mikulecky.
Biophys J, Vol 12, No 12, p 1642-1660, 1972, Illus.
Identifiers: Flow profiles, *Membranes, Filtration.

A concept is presented for modeling flows through membranes using continuum mechanics. Viscous interactions (due to velocity gradients) are explicitly incorporated and position-dependent local water-membrane interactions are taken into account before obtaining slab averages. This is in distinction to other treatments where strictly one-dimensional force balance equations are written using slab average friction coefficients which are really composite functions of local interactions. The viscous and other frictional interactions do not simply form linear combinations in the solutions to the the equations of motion. Flow profiles for pressure-driven flows ranging from Poiseuille's flow to diffusion flow are obtained depending on the strength and extent of the water-membrane interactions. The model is also applied to self-diffusion flows and the measurement of equivalent pore size. For a fixed pore size the ratio of filtration flow to self-diffusion flow for equal driving forces is able to vary over a wide range depending on the water-membranes interaction.--Copyright 1973, Biological Abstracts, Inc.
W74-13367

ECOLOGY OF UPPER CATCHMENT AREA OF RIVER NARMADA CLIMOVEGETATIONAL RELATIONSHIPS: I,
Saurashtra Univ., Rajkot (India). Dept. of Biosciences.
For primary bibliographic entry see Field 4A.
W74-13368

2F. Groundwater

FUNDAMENTALS OF TRANSPORT PHENOMENA IN POROUS MEDIA.
International Association for Hydraulic Research, Delft (Netherlands); and International Society of Soil Science, Amsterdam (Netherlands).
Available from Office of Continuing Education, Univ. of Guelph, Guelph, Ont., Canada Canadian $23.00 (2 Vol). Proc of 2nd International Symposium, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub (2 Vol), 1972. 797 p (total of Vols 1 and 2).

Descriptors: *Conferences, *Groundwater movement, *Soil water movement, Path of pollutants, Dispersion, Diffusion, Mixing, Hydrogeology, Filtration, Membrane processes, Infiltration, Saturated flow, Unsaturated flow.

The Second Symposium on Fundamentals of Transport Phenomena in Porous Media had the objective of attracting sceintists and engineers having a wide range of interests and backgrounds. Many disciplines are concerned with transport phenomena in porous media. Hydrologists are interested in groundwater movement and aquifer parameters; petroleum engineers are interested in secondary recovery processes in which petroleum is replaced by water or gas; chemical engineers are interested in filtration mechanisms and the behavior of reaction beds; textile researchers often consider fabrics as a porous material; and soil scientists have been interested in water movement as applied to infiltration, evaporation, drainage, salt leaching and plant uptake of water and nutrients. (See W74-12812 thru W74-12857) (Knapp-USGS)
W74-12811

OBSERVATIONS OF MIXING AND DIFFUSION IN POROUS MEDIA,
Mobile Research and Development Corp., Dallas, Tex.
J. P. Heller.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 1-26, 1972. 11 fig, 1 tab, 14 ref.

Descriptors: *Mixing, *Diffusion, *Porous media, *Groundwater movement, Darcys law, Numerical analysis, Mathematical models, Path of pollutants, Dispersion.

A physical description of the mechanisms of flow and dispersion is based on the interpretation of several observations of flow behavior. Darcy's law leads to a microscopic description of Navier-Stokes flow in which interstitial flow velocity is expressed in terms of the externally imposed flow. Observed flow reversability is not complete, and suggests an influence of diffusion in modifying traveltime distributions. The effects of permeability heterogeneity were also examined, using a numerical model with randomly placed permeability variations, and an effective dispersion coefficient was calculated from it. (See also W74-12811) (Knapp-USGS)
W74-12812

MATRIX PROPERTIES OF POROUS MEDIA,
Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
R. A. Greenkorn.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 27-57, 1972. 14 fig, 51 ref.

Descriptors: *Porous media, *Groundwater movement, Darcys law, Porosity, Particle size, Permeability, Dispersion, Capillary action, Adsorption, Wettability.

The matrix properties that characterize porous media are reviewed. It is necessary to relate geometric and flow properties to understand mechanisms of flow in porous media. The microscopic pore geometry is described with reference to pore size distributions, particle size distributions, and packing. Mechanical properties which are pertinent are also discussed. The flow properties such as permeability, dispersion, tortuosity, capillary pressure, connectivity, relative permeability, adsorption, and wettability which describe the matrix from the point of view of the fluid are used to describe the matrix. The relation of geometric and flow properties is discussed in terms of phenomenological, statistical, and deterministic models. Finally the media is characterized macroscopically in terms of heterogeneity, nonuniformity, and anistropy. This macroscopic characterization is defined at the level of Darcy's law using the distribution of permeability of porous media. (See also W74-12811) (Knapp-USGS)
W74-12813

PORE STRUCTURE AND FLOW PROPERTIES OF POROUS MEDIA,
Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
F. A. L. Dullien.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 58-73, 1972. 6 fig, 30 ref.

Descriptors: *Porous media, *Porosity, *Pores, *Rock properties, Groundwater movement, Permeability, Hydraulic conductivity, Flow.

The pore structure of many porous media consists of a three-dimensional array of voids which are separated from each other by narrower throats. A mercury porosimetry curve gives the distribution of the controlling throat sizes in the sample. Photomicrographic methods, based on the principles of quantitative stereology, determine the distribution of void sizes in a sample. The mercury porosimetry and photomicrographic distribution curves together provide a great deal more insight into the pore structure of a sample than either of them can provide by itself. Both curves were determined for a number of sandstones and some unconsolidated packs of particles. The two curves differed from each other drastically in every case. The difference between the curves may be used to measure the magnitude of the sequential variations in the cross section of the flow channels. Residual oil saturations found in laboratory oil recovery tests were successfully correlated for all the samples in terms of a parameter constructed from the two curves. Flow rate-pressure gradient experiments demonstrate that calculated permeabilities which neglect kinetic energy losses due to constrictions and expansions of flow channels may be too high by a factor of five or more. (See also W74-12811) (Knapp-USGS)
W74-12814

COMPUTER ANALYSIS OF THE PORE STRUCTURE OF ISOTROPIC POROUS MEDIA,
Agricultural Research Service, Saint Paul, Minn. Soil and Water Conservation Research Div.
D. A. Farrell, and W. E. Larson.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 74-87, 1972. 6 fig, 13 ref.

Descriptors: *Porous media, *Flow, *Groundwater movement, Porosity, Model studies, Mathematical models, Hydraulic conductivity, Permeability.

Fluid flow through a two-dimensional network model of the pore structure of a porous medium was analyzed by a high-speed digital computer. The effect of network size or number of pore domains on the computed conductivity increased as the heterogeneity of the porous medium increased. The effect of the ratio of domain size to mesh size on conducitvity increased slightly with network size and with increasing heterogeneity. The relative potential gradients for the different domains in the two-dimensional model were substantially affected both by network size and by the heterogeneity of the medium. Interdomain tortuosity seemed to be a minor factor and was only weakly dependent on network size. The computed conductivities and computed relationships between pore size and relative potential gradient were consistent with the predictions of a recently proposed conductance model of pore structure. Current pore models assume an invariant relationship between the relative potential gradient and the pores corresponding to a specific level of saturation. Using this assumption, results of this analysis suggest that conductivity predictions for heterogeneous media may be adversely affected. (See also W74-12811) (Knapp-USGS)
W74-12815

SIMILITUDE REQUIREMENTS FOR MOISTURE FLOW THROUGH THE POROUS MATERIALS,
Lund Inst. of Tech. (Sweden). Dept. of Building Technology.
For primary bibliographic entry see Field 2G.
W74-12816

THE FIELD STUDY OF SAND MOTION THROUGH POROUS MEDIUM BY MEANS OF LUMINOPHORS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W74-12817

TWO- AND THREE-POINT MODELS OF THE SOIL MOISTURE CHARACTERISTIC AND HYDRAULIC CONDUCTIVITY FOR FIELD USE,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 2G.
W74-12819

EVALUATION OF CAPILLARY PROPERTIES OF CAPROCKS,
Wyoming Univ., Laramie. Dept. of Petroleum Engineering.
M. A. Ibrahim, and D. L. Katz.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 137-154, 1972. 5 fig, 1 tab, 12 ref.

Descriptors: *Aquicludes, *Capillary conductivity, *Oil reservoirs, Hydraulic conductivity, Groundwater movement.
Identifiers: Caprocks(Oil reservoirs).

Methods are given for measuring capillary forces in caprocks of underground hydrocarbon reservoirs. Analysis of earth pressure gradients in such reservoirs is discussed with special reference to the presence of 'Delta Pressures.' Capillary theory as applied to caprocks is reviewed. The applicable and suggested methods of evaluation of capillary

roperties are: (a) restored state method by gas-water or oil-water displacement, (b) mercury intrusion, (c) nitrogen adsorption, and (d) water vapor pressure. The possibilities of improving the measuring techniques and interpretation of results are discussed. (See also W74-12811) (Knapp-USGS)
W74-12820

UMP CONDITIONS IN THE HYDRODYNAMICS OF POROUS MEDIA,
Agricultural Research Service, Madison, Wis. Soil and Water Conservation Research Div.
P. A. C. Raats.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 155-173, 1972. 3 fig, 28 ref.

Descriptors: *Porous media, *Groundwater movement, *Soil water movement, Infiltration, Percolation, Hydraulic conductivity, Interfaces, Boundary processes, Flow, Unsaturated flow.

Boundary conditions for a fluid flowing in a rigid porous medium are formulated on the basis of a mechanical continuum theory of mixtures. For isotropic, saturated media, the traditional boundary condition of continuity of the normal component of the flux is correct, and deviations from the traditional assumption that the pressure head is continuous are confined to very small distances from a boundary. On the basis of the traditional boundary conditions, at an interface between two unsaturated porous media whose hydraulic conductivity/pressure head curves intersect each other, the refraction of the streamlines may be away from the normal to the interface, absent, or towards the normal to the interface. Again using the traditional boundary conditions, the refraction of equipotentials and streamlines at an interface between anisotropic porous media is analyzed in detail. In particular, the direction along which there is no refraction is determined. The boundary condition for the pressure head is generalized to include a finite surface resistance. (See also W74-12811) (Knapp-USGS)
W74-12821

MATHEMATICAL FORMULATION OF TRANSPORT PHENOMENA IN POROUS MEDIA,
Hebrew Univ., Jerusalem (Israel). Dept. of Hydrology.
Y. Bachmat, and J. Bear.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 174-193, 1972. 4 ref.

Descriptors: *Soil water movement, *Groundwater movement, *Mathematical studies, Saturated flow, Unsaturated flow, Mass transfer, Convection, Energy transfer, Diffusion, Dispersion, Thermodynamics.

A mathematical formulation describes transport phenomena in porous media. A general definition is presented of a porous medium as a special type of a heterogeneous medium, without reference to any particular medium geometry. The microscopic and macroscopic levels of description of fields and their variations in a porous medium domain are discussed and the rules of passage from one level to the other are stated. Generalized macroscopic balance equations of any extensive quantity are developed and applied to the momentum, volume, mass and energy of a phase and to the mass of a component of it. These equations include terms describing transport by convection, dispersion, molecular diffusion and interphase transfer. A general formulation of boundary conditions is presented and applied to fields involving the transfer of entities for which balance equations were derived. (See also W74-12811) (Knapp-USGS)
W74-12822

LIMITS OF DETERMINISTIC PREDICTABILITY OF SATURATED FLOW EQUATIONS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
B. Sagar, and C. C. Kisiel.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ., Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 194-205, 1972. 4 fig, 12 ref.

Descriptors: *Saturated flow, *Equations, *Numerical analysis, Flow, Porous media, Groundwater movement, Mathematical models.
Identifiers: Error analysis.

The effect of uncertainties and lumping of parameters in the deterministic saturated flow equations on the predictability of these equations is discussed. With a simple example, it is shown that in a dynamic system with initial errors in the parameters the error in the predicted values grows with time. In this manner, the existence of an upper limit on the time up to which the partial differential equation can be used for prediction is sought. Such error studies appear necessary in the face of the data collection problem under real-world conditions. (See also W74-12811) (Knapp-USGS)
W74-12823

SUMMARY OF LATEST WORKS ON UNSTEADY FLOW OF LIQUIDS THROUGH POROUS MEDIA,
Institut Neftekhimicheskoi i Gazovoi Promyshlennosti, Moscow (USSR).
V. N. Shchelkachev.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 206-221, 1972. 25 ref.

Descriptors: *Unsteady flow, *Porous media, Saturated flow, Unsaturated flow, Drawdown, Equations, Hydrodynamics, Groundwater movement, Soil water movement.

Calculations connected with investigation of oil and water exploitation often consider plane-radial flows. Recent work in the USSR devoted to investigations of unsteady one-dimensional flows is reviewed. Special attention is paid to tabulated special functions, yielding simple calculation formulae for basic unsteady plane-radial flows. A very general single formula for calculations of all the three simplest types of unsteady one-dimensional flows is deduced. (See also W74-12811) (Knapp-USGS)
W74-12824

ANALYTICAL THEORY OF WATER MOVEMENT IN SOILS,
Connnecticut Agricultural Experiment Station, New Haven.
For primary bibliographic entry see Field 2G.
W74-12825

GENERALIZATION OF DARCY LAW FOR RHEOLOGICALLY COMPLEX LIQUIDS AND ERROR ESTIMATION OF CALCULATIONS BASED ON DARCY LINEAR APPROXIMATION,
Severnyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Leningrad (USSR).
For primary bibliographic entry see Field 2G.
W74-12826

THE NUMERICAL ANALYSIS OF FLOW IN HETEROGENEOUS POROUS MEDIA,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2G.
W74-12828

HYDRAULIC CONDUCTIVITY OF WATER-RESISTANT PROTECTIONS OF CLAYEY SOILS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki, Leningrad (USSR).
For primary bibliographic entry see Field 2G.
W74-12829

FLOW OF WATER THROUGH POROUS MEDIA AT LOW SHEAR RATES,
New South Wales Univ., Kensington (Australia). Dept. of Civil Engineering.
C. R. Dudgeon.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 279-291, 1972. 3 fig, 4 ref.

Descriptors: *Darcys law, *Flow, *Porous media, Groundwater movement, Soil water movement, Aqueous solutions, Stress, Strain, Hydraulic conductivity.

Non-Darcy flow behavior in groundwater movement and theoretical arguments used to justify non-Darcy flow at low shear rates and their applicability to the flow of water through relatively coarse, clay-free granular media and capillary tubes are reviewed. In experiments using a capillary tube, water appeared to behave as a thixotropic non-Newtonian fluid at low shear rates. It is suggested that changes in the nature and concentration of ions in solution during the course of experiments or in natural groundwater flow may significantly affect the stress-strain characteristics of water and thus its response to applied hydraulic gradients. (See also W74-12811) (Knapp-USGS)
W74-12830

FLOW OF WATER IN SWELLING SOIL,
Research Inst. for Land Reclamation and Improvement, Zbraslav (Czechoslovakia).
For primary bibliographic entry see Field 2G.
W74-12831

UNSATURATED FLOW IN EXPANSIVE SOILS,
McGill Univ., Montreal (Quebec). Soil Mechanics Lab.
For primary bibliographic entry see Field 2G.
W74-12832

EFFECTS OF AIR PRESSURE DURING WATER FLOW IN AN UNSATURATED, STRATIFIED VERTICAL COLUMN OF SOIL,
Grenoble Univ. (France). Laboratoires de Mecanique des Fluides.
For primary bibliographic entry see Field 2G.
W74-12833

IMBIBITION IN FLOW OF TWO IMMISCIBLE LIQUIDS THROUGH A CRACKED POROUS MEDIUM WITH SMALL VISCOSITY DIFFERENCE,
J. V. Regional Coll. of Engineering and Technology, Surat (India). Dept. of Applied Mathematics.
A. P. Verma.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ., Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 393-402, 1972. 2 fig, 17 ref.

Descriptors: *Porous media, *Saturated flow, *Unsaturated flow, Groundwater movement, Wettability, Wetting.
Identifiers: *Imbibition, *Multiphase flow.

A mathematical description is given of the imbibition phenomenon in displacement problems involving two liquid phases and an inhomogeneous porous media. Imbibition depends essentially upon the relative wetting ability of the fluids with respect to the porous medium. Such problems have gained considerable importance particularly in petroleum technology and hydrogeology. The basic assumptions underlying the study are that the viscosity difference between the resident and invading liquids is small, the invading liquid is a preferentially wetting phase, and the inhomogeneity in the media is due to the presence of a well developed system of randomly oriented fissures. A nonlinear differential equation was formulated and its approximate mathematical solution under appropriate boundary conditions was obtained. (See also W74-12811) (Knapp-USGS)
W74-12834

UNSATURATED FLOW OF WATER IN ANISOTROPIC POROUS MEDIA,
National Council for Scientific Research, Lusaka (Zambia).
For primary bibliographic entry see Field 2G.
W74-12835

STEADY STATE POTENTIAL PROFILES IN LAYERED POROUS MATERIALS,
Iranian Plan and Budget Organization, Tehran. Technical Bureau.
M. Bybordi.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 413-424, 1972. 4 fig, 10 ref.

Descriptors: *Infiltration, *Unsaturated flow, *Anisotropy, Moisture content, Moisture tension, Soil water movement, Profiles, Potential flow.

The shape of steady-state potential profiles in a layered porous material was examined both theoretically and experimentally. A variety of shapes are possible, depending on the rate of flow and the hydrologic properties of the layers. In arid zones, sprinkler irrigation or rainfall usually supplies water at rates too low for ponded water to be maintained on the soil surface. Infiltration under these conditions requires a knowledge of the dependence of the hydraulic conductivity and the pore water suction or pressure of a porous material upon the degree of saturation, in order to apply Darcy's law to the calculation of the potential profiles in a variety of situations, especially those of layered porous materials. (See also W74-12811) (Knapp-USGS)
W74-12836

A VERSATILE SOIL WATER FLUX METER,
Agricultural Research Service, Madison, Wis. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2G.
W74-12837

DYNAMIC MEASUREMENT OF HYDROLOGIC PROPERTIES OF A LAYERED SOIL DURING DRAINAGE AND EVAPORATION, FOLLOWED BY WETTING,
British Columbia Univ., Vancouver. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W74-12838

FLOW LAWS FOR PSEUDOPLASTIC INJECTION FLUIDS (CLAY SUSPENSIONS) IN GRAVEL,
Karlsruhe Univ (West Germany). Institut fuer Bodenmechanik und Felsmechanik.
K. Gelbert, and A. Blinde.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 461-481, 1972. 6 fig, 1 tab, 5 ref.

Descriptors: *Rheology, *Suspension, *Clays, *Grouting, Permeability, Plasticity, Viscosity, Porous media, *Gravels.

In grouting, viscous materials are injected into the subsoil in order to improve the impermeability and stability. The penetration of an injection is dependent on the stagnation gradient, and the rate of grouting is a function of the permeability. A conceptual pore canal model is based on an assembly of spheres, the pore size distribution of which is determined in analogy to the known grain size distributions of natural porous systems. The model system derived from this is composed of a combination of tubes with varying diameters. Results of model calculations were compared with results of pumping clay suspensions through gravels. For the highest discharge velocity used, flow is laminar in the pore system. The assumption that permeability is constant with respect to flow rate, especially for relatively high discharge velocities is approximately valid. The errors involved lie in the order of a factor of ten which is no greater than other errors commonly associated with subsoil hydraulics. (See also W74-12811) (Knapp-USGS)
W74-12839

FILTER PROCESSES IN RIVER BEDS,
Karlsruhe Univ. (West Germany).
For primary bibliographic entry see Field 2A.
W74-12840

THE COMBINED STUDY OF SEEPAGE PROPERTIES OF SEMIPERMEABLE SOILS FOR ESTIMATING INTERRELATIONSHIP OF AQUIFERS,
Moscow State Univ. (USSR). Surface and Ground Waters Interrelationship Lab.
S. M. Semenova-Erofeeva, G. M. Berezkina, and I. A. Briling.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 495-513, 1972. 4 fig, 4 tab, 24 ref.

Descriptors: *Clays, *Aquicludes, *Aquitards, *Artesian aquifers, Hydrogeology, Aquifer characteristics, Permeability, Analytical techniques, Geochemistry, Groundwater movement, Seepage.

Studies of water transport in clay rocks are important in solving a number of regional hydrogeological problems. Combined field investigations give an average characterization of the permeability of confining clay interlayers through which leakage occurs between aquifers. Laboratory methods reveal the mechanisms of transport and separate its components into hydraulic, osmotic and diffusion flows, and explain abnormalities depending on the mineralogical composition, the degree of dispersity, density, temperature, and hydrochemical conditions. Application of electron microscopy and X-ray analysis makes it possible to explain these abnormalities from the viewpoint of structural and textural changes in clay rocks subjected to hydraulic flow. Combined experimental and field work establishes the general calculation pattern to estimate properly the permeability and interrelationship of aquifers. (See also W74-12811) (Knapp-USGS)
W74-12841

USING POTENTIAL FLOW THEORY TO DETERMINE SOIL MOISTURE DISTRIBUTION ABOUT AN ISOLATED TREE,
Northern Forest Research Center, Edmonton (Alberta).
For primary bibliographic entry see Field 2G.
W74-12842

HYDRODYNAMIC REGIMES OF SUBSURFACE RETURN FLOW,
Howard Univ., Washington, D.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W74-12843

VARIATION OF GROUND WATER DISCHARGE ZONE AS A FUNCTION OF INFILTRATION RATE,
Tehran Polytechnic (Iran). Civil Engineering Inst.
M. Shahbazi.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 536-555, 1972. 11 fig, 7 ref.

Descriptors: *Groundwater movement, *Infiltration, *Discharge(Water), *Mathematical models, Groundwater basins, Water balance.

The variation of the discharge zone as a function of infiltration rate was studied in a two-dimensional mathematical model of a steady state, homogeneous, isotropic groundwater basin. The geometry of the zones of recharge and discharge is a function of ground surface profile, variation in rate of recharge, hydraulic conductivity of porous media, and the geometry of the flow domain. The model consists of two derived series of harmonic functions, one determining the shape of groundwater table and the other expressing the continuity equation between recharge and discharge. With an increase in the ratio between rate of recharge and hydraulic conductivity of the media, the point between recharge and discharge moves towards the mid-point between valley bottom and water divide. With other parameters constant, the steeper the ground surface slope the more concentrated is the flow in the discharge zone. (See also W74-12811) (Knapp-USGS)
W74-12844

TRANSPORT PHENOMENA CONTROLLING EVAPORATION FROM SOIL,
Department of Agriculture, Ottawa (Ontario). Soil Research Inst.
For primary bibliographic entry see Field 2D.
W74-12845

EFFECT OF SOIL SALINITY ON THE RATE OF EVAPORATION,
Baghdad Univ. (Iraq). Coll. of Agriculture.
For primary bibliographic entry see Field 2G.
W74-12846

MODEL RESEARCH INTO THE SPEED AND HEIGHT OF CAPILLARY INFILTRATION IN SOME SOILS WITH TWO LEVELS OF MOISTURE,
Szkola Glowna Gosodarstwa Wiejskiego, Warsaw (Poland). Inst. of Crop Production.
For primary bibliographic entry see Field 2G.
W74-12847

COUPLING BETWEEN TRANSPORT PROCESSES IN POROUS MEDIA,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soil Science.
G. H. Bolt, and P. H. Groenevelt.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous

Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 630-652, 1972. 3 tab, 4 ref.

Descriptors: *Porous media, *Membrane processes, *Mass transfer, *Ion transport, Diffusion, Osmosis, Flow, Groundwater movement, Thermodynamics.

Several sets of fluxes may be chosen to describe the transport processes occurring in porous media. Depending on the chosen set, the degree of coupling between fluxes will differ. Examples are given of coupling coefficients based on permiselective properties of the matrix. (See also W74-12811) (Knapp-USGS)
W74-12848

COUPLING BETWEEN TRANSPORT PROCESSES IN AN ANISOTROPIC MIXTURE OF FLUIDS AND SOLID PARTICLES,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia).
For primary bibliographic entry see Field 2J.
W74-12849

PHYSICO-CHEMICAL AND MICROBIAL REACTION EFFECTS ON TRANSPORT IN POROUS MEDIA,
Wisconsin Univ., Madison. Dept. of Soils.
For primary bibliographic entry see Field 5B.
W74-12850

RELATIONSHIP BETWEEN THE HYDROLOGY, FLUID CHEMISTRY AND DIAGENETIC MINERAL FORMATION IN THE COASTAL AREAS OF THE PERSIAN GULF,
Ontario Water Resources Commission, Ottawa.
For primary bibliographic entry see Field 2L.
W74-12851

THE INFLUENCE OF WATER TRANSPORT AND TRANSFER OF HEAT BY FREEZING AND DEFROSTING ON SOIL GENESIS,
Akademiya Nauk SSSR, Moscow. Institut Agrokhimii i Pochvovedeniya.
For primary bibliographic entry see Field 2G.
W74-12852

EFFECT OF MICROBIOLOGICAL PROCESSES ON PERCOLATION OF WATER THROUGH SOIL,
Gruzinskii Nauchno-Issledovateslkii Institut Gidrotekhniki i Melioratsii, Tiflis (USSR).
For primary bibliographic entry see Field 2G.
W74-12853

SOME RECENT APPLICATIONS OF THE THEORY OF DISPERSION IN POROUS MEDIA,
Ecole Nationale Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
J. J. Fried.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 722-731, 1972. 2 fig, 15 ref.

Descriptors: *Dispersion, *Porous media, Path of pollutants, Groundwater movement, Equations, Waste disposal wells.

Some practical results about the behavior of the classical dispersion equation in field applications and its validity as a mathematical model of dispersion are discussed. Methods used to collect in-situ dispersion coefficients are surveyed. The general diffusion equation is not the perfect dispersion model, but its accuracy is sufficient for most practical problems. It is necessary to make in-situ experiments to collect longitudinal dispersion coefficients as laboratory results completely differ from field values. Change of scale is not yet solved. A set of experiments should be derived at each scale of dispersion. (See also W74-12811) (Knapp-USGS)
W74-12854

SOLUTE TRANSPORT IN AGGREGATED SOILS: TRACER ZONE SHAPE IN RELATION TO PORE-VELOCITY DISTRIBUTION AND ADSORPTION,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 5B.
W74-12855

A NEW METHOD FOR DETERMINING AND INTERPRETING DISPERSION COEFFICIENTS IN POROUS MEDIA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
D. W. Lawson, and D. E. Elrick.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 753-777, 1972. 16 fig, 11 ref.

Descriptors: *Dispersion, *Tracers, *Porous media, *Groundwater movement, *Soil water movement, Tracking techniques, Sampling, Instrumentation, Diffusion, Mixing.

A tracer method for determining longitudinal and transverse dispersion coefficients in the field was investigated under laboratory conditions using a glass bead medium. For the ideal case of perfect two-dimensional dispersion in a homogeneous isotropic medium, the density and viscosity along a vertical line through a horizontally dispersed tracer solution should be constant. Considering the natural variability of earth materials, a curve-matching technique is of sufficient accuracy for practical field applications. The precision of the method is such that comparative studies of the longitudinal and transverse dispersion coefficients of different porous media can be undertaken. Field applications will always suffer from the physical difficulties inherent in providing the instantaneous line source; in locating a natural, uniform, two-dimensional velocity field; and from the necessity of locating the downstream sampling point on the same streamline as the injection point. Care must be taken to avoid hydrodynamic instabilities. (See also W74-12811) (Knapp-USGS)
W74-12856

COMPARISON OF DISPERSION CHARACTERISTICS IN FISSURED ROCK,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-12857

FINITE ELEMENT ANALYSIS OF THREE-DIMENSIONAL GROUNDWATER FLOW PROBLEMS,
University of Wales Inst. of Science and Tech., Cardiff. Dept. of Civil Engineering and Building Technology.
P. W. France.
Journal of Hydrology, Vol 21, No 4, p 381-398, 1974. 14 fig, 12 ref.

Descriptors: *Groundwater, *Aquifers, *Groundwater movement, Digital computers, *Numerical analysis, *Finite element analysis, Permeability, Mathematical models, Equations, Steady flow, Unsteady flow.
Identifiers: Finite difference method, *Three-dimensional flow, Fluid flow systems, Galerkins method.

A numerical method was presented for analysing either steady state or transient three-dimensional groundwater flow problems. The governing equation was formulated in terms of the finite element process using the Galerkin approach, and cubic isoparametric elements were used to simulate the flow domain as these permit accurate modelling of curved boundaries. Particular attention was paid to the time dependent movement of the phreatic surface where an iterative technique based on the replacement of the original transient problem by a discrete number of steady state problems was used to effect a solution. Furthermore, in tracing the movement of the surface, use was made of the element formulation theory in order to compute the normal to the boundary. The validity of the technique was first established by analysing a radially symmetrical problem for which an alternative analytical solution was available. Finally, a general three-dimensional flow system was studied for which there is no known analytical solution. Relatively few elements were required to yield practical solutions. (Schicht-ISWS)
W74-12984

GROWTH AND DECAY OF GROUNDWATER MOUNDS INDUCED BY PERCOLATION,
California Univ., Davis.
M. A. Marino.
Journal of Hydrology, Vol 22, No 3-4, p 295-301, 1974. 1 fig, 9 ref, append.

Descriptors: *Water table aquifers, *Deep percolation, *Mathematical studies, Groundwater, Water table, Aquifers, Analytical techniques, Laplaces Equation, Hydraulic conductivity, Groundwater movement.
Identifiers: *Groundwater mounds, Analytic solutions.

Analytical expressions were derived which described the growth and decay of groundwater mounds in an unconfined aquifer receiving uniform vertical percolation. The solutions were expressed in terms of the head averaged over the depth of saturation and were applicable when the water table rise was smaller than 50% of the initial depth of saturation. The aquifer was homogeneous, isotropic, resting on a horizontal impermeable base, and discharging into a surface reservoir in which the water level remained equal to that of the main flow before the incidence of percolation. The rate of percolation was maintained by a spreading area in the form of an infinitely long strip, but of finite width, located above the aquifer. The rate of percolation relative to the hydraulic conductivity was consider so small that the vertically downward percolation was almost completely refracted in the direction of the slope of the water table. (Visocky-ISWS)
W74-12987

ATOLL PERMEABILITY CALCULATED FROM TIDAL DIFFUSION,
Scripps Institution of Oceanography, La Jolla, Calif.
R. K. Lam.
Journal of Geophysical Research, Vol 79, No 21, p 3073-3081, July 20, 1974. 12 fig, 12 ref. NOAA-2-35208.

Descriptors: *Atolls, *Islands, *Lagoons, *Groundwater, *Permeability, Diffusion, Tides, Diurnal, Tidal effects, Tidal waters, Homogeneity, Mathematical models, Water wells, Water level fluctuations, Aquifer characteristics, Oceans.
Identifiers: *Swains Island, *Tokelau group, Numerical models, Pressure field, Model comparisons.

A method was presented for calculating the average subsurface permeability of an atoll from surface measurements of groundwater tides. Tide measurements of about 1-month duration were taken on Swains Island, an atoll located in the southern Tokelau group. Records were obtained

for the ocean, the lagoon, and eight wells on land. These measurements were compared with numerical models to predict subsurface permeability. The complex nature of the data necessitated the use of models with complicated but realistic surface boundary conditions. Tide amplitude comparisons predicted a mean permeability of 0.0000044 sq cm, whereas phase considerations led to a prediction of 0.0000141 sq cm. Because the set of measurements could be modeled by adjusting surface boundary conditions, it was not possible to investigate the question of inhomogeneity in the interior of Swains Island. (Prickett-ISWS)
W74-12995

SIMULTANEOUS EVALUATION OF DRAWDOWN DATA FROM SEVERAL OBSERVATION WELLS BY MEANS OF A MODIFICATION OF THE WALTON METHOD,
Technische Hogeschool, Delft (Netherlands). Geophysical Lab.
For primary bibliographic entry see Field 4B.
W74-12999

AQUIFER ANALYSIS USING BACKWARD DIFFERENCE METHODS,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W74-13012

ANOMALOUS TRANSMISSION OF WATER THROUGH CERTAIN PEATS,
Dundee Univ. (Scotland). Dept. of Biological Sciences.
H. A. P. Ingram, D. W. Rycroft, and D. J. A. Williams.
Journal of Hydrology, Vol 22, No 3-4, p 213-218, 1974. 5 fig, 12 ref.

Descriptors: *On-site investigations, *Piezometers, *Hydraulic conductivity, *Peat, Bogs, Darcys law, On-site tests, Testing procedures, Porous media, Groundwater movement.
Identifiers: Humified peat, *Sphagnum, Eriophorum vaginatum, Culluna vulgaris, *United Kingdom(Scotland), Grampian foothills, Perthshire(Scotland).

Field experiments were described in which seepage tubes were used under variable-head and constant-head conditions. The estimates of 'hydraulic conductivity' obtained from humified peat showed time dependence, but they also increased with head, indicating departure from Darcy's law. It is suggested that this law is only obeyed in unhumified peat. (Visocky-ISWS)
W74-13014

HYDROGEOLOGY OF THE POTTSVILLE FORMATION IN NORTHEASTERN OHIO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13015

HYDROLOGY AND WATER RESOURCES OF THE DEERFIELD RIVER BASIN, MASSACHUSETTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13016

AVAILABILITY OF FRESH GROUND WATER IN NORTHEASTERN WORCESTER COUNTY, MARYLAND: WITH SPECIAL EMPHASIS ON THE OCEAN CITY AREA,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 4B.
W74-13175

AN EVALUATION OF THE MAGOTHY AQUIFER IN THE ANNAPOLIS AREA, MARYLAND,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 4B.
W74-13176

HYDROGEOLOGIC ASPECTS OF STRUCTURAL DEFORMATION IN THE NORTHERN GULF OF MEXICO BASIN,
Geological Survey, Bay St. Louis, Miss.
P. H. Jones, and R. H. Wallace, Jr.
Journal of Research, US Geological Survey, Vol 2, No 5, p 511-517, September-October, 1974. 13 fig, 13 ref.

Descriptors: Gulf of Mexico, *Hydrogeology, *Structural geology, *Sedimentation, *Gulf Coastal Plain, *Pore pressure, Pore water, Subsidence, Faults(Geologic), Deformation, Continental margin, Continental Shelf, Continental slope, Sedimentary structures.

Resistance of unconsolidated clastic sediments to structural deformation is an inverse function of water content and pore pressure and has no uniform relation to depth of burial in the Gulf of Mexico basin. Deposited rapidly along the northwestern margin of the Gulf Coast geosyncline, younger sediments have buried older ones deeply before they could drain properly in response to compaction stress of overburden load. Contemporaneous gravity faults of major dimension occur along gulfward margins of delta-front sand bodies, reflecting the effect of sediment facies distribution on structure. Sand bodies are more stable than shale masses. Such contemporaneous or growth faults are a most distinctive feature of the geology of the Gulf of Mexico basin; they are normal faults with progressive increase in throw with depth and, across which, from upthrown to downthrown block, correlative section thickens greatly. In plan and profile, faulted masses resemble landslides; fault planes are concave gulfward and upward, the dip decreasing with depth. Fault movement rotates the block, causing reversal of dip of beds in the block and sealing the land ward ends of included aquifers to discharge of waters of compaction. This proves geopressured conditions so common in the Gulf Coastal Plain and Continental Shelf. Early development of geopressure in the block reduces resistance to shear, and progressive landward side loading of the block sustains rotational stress. Geopressured water flowing into the fault zone-the easiest escape route-reduces drag and facilitates movement on the fault. (Knapp-USGS)
W74-13179

REGIONAL FLOW SYSTEM AND GROUNDWATER QUALITY IN WESTERN OHIO,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 4B.
W74-13181

GROUND-WATER FAVORABILITY AND SURFICIAL GEOLOGY OF PARTS OF THE MEDXNEKEAG RIVER AND PRESTILE STREAM BASINS, MAINE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13192

GROUND-WATER FAVORABILITY AND SURFICIAL GEOLOGY OF THE LOWER ST. JOHN RIVER VALLEY, MAINE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13193

SUMMARY GROUND-WATER RESOURCES OF BEAVER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13200

SUMMARY GROUND-WATER RESOURCES OF WASHINGTON COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13201

SUMMARY GROUND-WATER RESOURCES OF WESTMORELAND COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13202

SUMMARY GROUND-WATER RESOURCES OF BUTLER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13203

SUMMARY GROUND-WATER RESOURCES OF ALLEGHENY COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13204

SUMMARY GROUND-WATER RESOURCES OF ARMSTRONG COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13205

INFLUENCE OF RECHARGE BASINS ON THE HYDROLOGY OF NASSAU AND SUFFOLK COUNTIES, LONG ISLAND, NEW YORK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-13206

HYDROGEOLOGIC CHARACTERISTICS OF THE SURFICIAL AQUIFER IN NORTHWEST HILLSBOROUGH COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
W. C. Sinclair.
Florida Bureau of Geology, Tallahassee, Information Circular No 86, 1974. 98 p, 1 fig, 4 tab, 10 ref.

Descriptors: *Hydrogeology, *Florida, *Artificial recharge, Aquifers, Aquicludes, Aquifer characteristics, Aquifer testing, Water levels, Test wells.
Identifiers: *Hillsborough County(Fla).

To study the feasibility of artificial recharge of the shallow aquifer in Hillsborough County, Florida, 59 holes were augered to the top of the limestone Floridan Aquifer. Lithologic and gamma logs of the holes were used in conjunction with laboratory analyses of samples to define the hydrogeology of the unconsolidated deposits of the surficial aquifer overlying the limestone. The surficial aquifer comprises an upper fine sand unit which averages about 15 feet thick and a lower sequence of sandy clay and clayey sand layers which average about 25 feet thick. Median grain size, specific yield, and vertical permeability of the surficial aquifer decrease downward. The coefficient of vertical permeability of the sand is about 100 gallons per day per square foot, but the coefficient of vertical permeability of the lower sand and clayey sand is much lower, ranging from 0.01 to 0.1 gpd per square foot. A confining layer of dense clay underlies the surficial aquifer, separating it from the Floridan Aquifer. The potentiometric surface in the surficial aquifer stands in average of 10 feet above that in the Floridan. Leakage of about 140,000 gal per day per sq mi from the surficial aquifer to the Floridan occurs through the confining layer as well as through perforations in the confining layer. (Knapp-USGS)
W74-13208

ROUND-WATER CONDITIONS IN THE OWER HASSAYAMPA AREA, MARICOPA OUNTY, ARIZONA,
eological Survey, Phoenix, Ariz.
r primary bibliographic entry see Field 4B.
74-13209

ASIBILITY STUDY FOR DEVELOPMENT OF OT-WATER GEOTHERMAL SYSTEMS,
lifornia Univ., Riverside. Inst. of Geophysics d Planetary Physics.
r primary bibliographic entry see Field 4B.
74-13213

NUAL REPORT ON GROUND WATER IN RIZONA, SPRING 1972 TO SPRING 1973,
eological Survey, Phoenix, Ariz.
r primary bibliographic entry see Field 4B.
74-13350

G. Water In Soils

IE WATER RELATIONS OF THE ALGA ANIDIUM CALDARIUM IN SOIL,
lifornia Univ., Los Angeles. Dept. of Bacteriology.
r primary bibliographic entry see Field 5B.
74-12777

IE GROWTH OF SELECTED MYCORRZAL FUNGI IN RESPONSE TO INDUCED ATER STRESS,
lo. State Univ, Dep. for and Wood Sci., Fort llins, Colo. Colorado State Univ., Fort Collins. pt. of Forest and Wood Science.
r primary bibliographic entry see Field 5B.
74-12789

NDAMENTALS OF TRANSPORT ENOMENA IN POROUS MEDIA.
ternational Association for Hydraulic Research, lft (Netherlands); and International Society of il Science, Amsterdam (Netherlands).
r primary bibliographic entry see Field 2F.
74-12811

MILITUDE REQUIREMENTS FOR OISTURE FLOW THROUGH THE POROUS ATERIALS,
nd Inst. of Tech. (Sweden). Dept. of Building chnology.
Bomberg.
Proc of 2nd International Symposium on Fundmentals of Transport Phenomena in Porous edia, August 7-11, 1972, Guelph Univ, Ontario: ternational Association for Hydraulic Research d International Society of Soil Science Joint b, Vol 1, p 88-101, 1972. 4 fig, 1 tab, 9 ref.

escriptors: *Porous media, *Unsaturated flow, filtration, Capillary conductivity, Wetting, Soil ater movement, Groundwater movement, rmeability, Hydraulic conductivity.

nowledge of the moisture retention (drying and etting) and conductivity curves is sufficient to aracterize a porous material and its response to y moisture flow. (See also W74-12811) (Knapp-SGS)
74-12816

VO- AND THREE-POINT MODELS OF THE OIL MOISTURE CHARACTERISTIC AND YDRAULIC CONDUCTIVITY FOR FIELD E,
gricultural Research Service, Beltsville, Md. ydrograph Lab.
S. Rogowski.
Proc of 2nd International Symposium on Fundmentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 124-136, 1972. 5 fig, 21 ref.

Descriptors: *Soil water movement, *Infiltration, Unsaturated flow, Model studies, Moisture tension, Porous media, Hydraulic conductivity.
Identifiers: *Soil moisture characteristic.

A model is proposed for estimating the soil moisture characteristic and hydraulic conductivity when reliable experimental results are not available. Soil moisture characteristic is estimated from the values of water content and pressure at air entry and at 15 bars, and then used as an input to a simplified pore size interaction model. Sensitivity of the model to the variation of input parameters is explored. Temperature-dependent variation is less than the postulated conductivity limits. Results show that hydraulic conductivity as a function of water content is primarily influenced by the choice of water contents at air entry and at 15 bars, while hydraulic conductivity as a function of pressure is influenced by pressure at air entry and can be estimated from experimental values of pressure at air entry and conductivity at water entry. (See also W74-12811) (Knapp-USGS)
W74-12819

JUMP CONDITIONS IN THE HYDRODYNAMICS OF POROUS MEDIA,
Agricultural Research Service, Madison, Wis. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2F.
W74-12821

MATHEMATICAL FORMULATION OF TRANSPORT PHENOMENA IN POROUS MEDIA,
Hebrew Univ., Jerusalem (Israel). Dept. of Hydrology.
For primary bibliographic entry see Field 2F.
W74-12822

SUMMARY OF LATEST WORKS ON UNSTEADY FLOW OF LIQUIDS THROUGH POROUS MEDIA,
Institut Neftekhimicheskoi i Gazovoi Promyshlennosti, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-12824

ANALYTICAL THEORY OF WATER MOVEMENT IN SOILS,
Connnecticut Agricultural Experiment Station, New Haven.
J-Y. Parlange.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 222-236, 1972. 4 fig, 21 ref.

Descriptors: *Soil water movement, *Equations, *Infiltration, Hydraulic conductivity, Diffusivity, Absorption, Mathematical studies, Unsteady flow.

Approximate but analytic expressions are given for the solution of the time-dependent infiltration equation with arbitrary soil properties. Detailed comparison is made with Philip's series expansion in one-dimension. The usefulness of the method is illustrated by the results of some recent two-dimensional absorption experiments. Singular perturbation techniques are of great value in study of gravity effects in multidimensional problems. Steady infiltration from a semicircular furrow is treated as an example. (See also W74-12811) (Knapp-USGS)
W74-12825

GENERALIZATION OF DARCY LAW FOR RHEOLOGICALLY COMPLEX LIQUIDS AND ERROR ESTIMATION OF CALCULATIONS BASED ON DARCY LINEAR APPROXIMATION,
Severnyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Leningrad (USSR).
N. S. Nerpina, and V. J. Yangarber.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 237-244, 1972. 4 fig, 11 ref.

Descriptors: *Infiltration, *Rheology, *Darcys law, Soil water movement, Groundwater movement, Hydraulic conductivity.

To explain nonlinear infiltration, a dependence is suggested which generalizes Darcy law for the case when the actual hydraulic gradient may be higher or lower than the thereshold. A significant error in calculations based on the Darcy linear law arises when water is moving in soils with the infiltration coefficient in the order of 0.0001 cm per sec and lower. (See also W74-12811) (Knapp-USGS)
W74-12826

A NEW ANALYTICAL TREATMENT FOR THE INFILTRATION PROBLEM,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. J. Morel-Seytoux.
In: Proc of 2nd International Symposium of Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 257-265, 1972. 7 ref.

Descriptors: *Infiltration, *Soil water movement, *Unsaturated flow, *Equations, Mathematical studies, Porous media.

The solution to the infiltration problem viewed as a two-phase compressible fluid flow problem can be obtained fairly simply. The technique is applicable, in a modified form, to solve the unsaturated flow equation and the results obtained by this method are similar to those obtained by the perturbation method for small times in the limiting case when air compressibility and resistance to air flow are negligible. (See also W74-12811) (Knapp-USGS)
W74-12827

THE NUMERICAL ANALYSIS OF FLOW IN HETEROGENEOUS POROUS MEDIA,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
F. D. Whisler, and K. K. Watson.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 245-256, 1972. 6 fig, 8 ref.

Descriptors: *Porous media, *Infiltration, *Percolation, *Unsaturated flow, *Numerical analysis, Mathematical models, Heterogeneity, Hydraulic conductivity, Soil water movement.

Ponded infiltration and gravity drainage of heterogeneous porous media were studied using numerical analysis of the flow equations. All media were assumed to exhibit scale heterogeneity, specifically defined in terms of a linear variation of the saturated hydraulic conductivity with depth. The hydrologic characteristics were chosen so that their form validly represented real data. The spatial variation of the hydrologic characteristics was initially defined in terms of the air-entry value or water entry value of the media at the point in question and empirical relationships

between these values and the saturated hydraulic conductivity. The pressure head and water content profiles calculated by these analyses exhibit some unusual shapes due to the nature of the media. These results can aid the interpretation of possible field data where the medium is assumed to be homogeneous when, in fact, it is heterogeneous. (See also W74-12811) (Knapp-USGS)
W74-12828

HYDRAULIC CONDUCTIVITY OF WATER-RESISTANT PROTECTIONS OF CLAYEY SOILS,
Vsesoyuznvi Nauchno-Issledovatelskii Institut Gidrotekhniki, Leningrad (USSR).
V. N. Zhilenkov.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 266-278, 1972. 2 tab, 11 ref.

Descriptors: *Clays, *Clay loam, *Soil water movement, *Darcys law, Hydraulic conductivity, Porosity, Unsaturated flow, Saturated flow, Porous media.

Hydraulic conductivity changes in clayey soils with consolidation and the validity of Darcy's law in such soils were investigated. The permeability coefficient is exponentially-dependent upon the porosity coefficient of clayey soils. Better correlation is achieved when the porosity coefficient for the soil at the liquid limit is included in the exponent. Formulae are suggested for calculating the hydraulic conductivity of a nonuniformly consolidated clay layer serving as a water barrier. Darcy's law is valid in clayey soils. (See also W74-12811) (Knapp-USGS)
W74-12829

FLOW OF WATER THROUGH POROUS MEDIA AT LOW SHEAR RATES,
New South Wales Univ., Kensington (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W74-12830

FLOW OF WATER IN SWELLING SOIL,
Research Inst. for Land Reclamation and Improvement, Zbraslav (Czechoslovakia).
F. Dolezal, and M. Kutilek.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972. Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 292-305, 1972. 26 ref.

Descriptors: *Soil water movement, *Expansive soils, Clays, Porosity, Permeability, Fractures(Geologic).

Flow of water in swelling soils was analyzed. Fissure porosity depends upon the moisture and the flow in soil containing fissures. Characteristic moistures are therefore distinguished when the one-dimensional volume change converts into three-dimensional volume change, and when the flow in fissures starts to be turbulent. It is demonstrated that the dependence of the porosity of soil mass upon its moisture is not compatible in unsaturated soil with the dependence of the same porosity upon the effective pressure. (See also W74-12811) (Knapp-USGS)
W74-12831

UNSATURATED FLOW IN EXPANSIVE SOILS,
McGill Univ., Montreal (Quebec). Soil Mechanics Lab.
R. N. Yong, and B. P. Warkentin.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 306-319, 1972. 6 fig, 7 ref.

Descriptors: *Soil water movement, *Unsaturated flow, *Expansive solid, *Diffusion, Equations, Expansive clays, Hydraulic conductivity, Mathematical models.

The soil-water diffusion equation is modified in view of the requirement for correspondence between mathematical and physical models, and also in the light of experimental results on diffusion in partially-saturated soils where volume changes occur. The problem of expansive soils in the context of diffusion requires that a closer examination of the driving potentials specified in the generalized Darcy law be made. The pressure potential can no longer be assumed to be the main driving potential in view of the existence of internal potential gradients which themselves will cause water movement. Thus a certain degree of modification of the mathematical model is required, where volume change or swelling (osmotic) pressure might be accounted for in the diffusion equation. (See also W74-12811) (Knapp-USGS)
W74-12832

EFFECTS OF AIR PRESSURE DURING WATER FLOW IN AN UNSATURATED, STRATIFIED VERTICAL COLUMN OF SOIL,
Grenoble Univ. (France). Laboratoires de Mecanique des Fluides.
G. Vachaud, M. Vauclin, M. Wakil, and D. Khanji.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 357-377, 1972. 10 fig, 1 tab, 17 ref.

Descriptors: *Unsaturated flow, *Atmospheric pressure, *Infiltration, *Soil water movement, Soil physical properties, Soil horizons, Soil profiles, Moisture tension.

The effects of air pressure during constant flux infiltration and during gravity drainage were studied experimentally. Water content was measured by gamma ray attenuation; water pressures were obtained simultaneously at ten different levels in the column using tensiometers connected to pressure transducers. The soil column consisted of three layers: fine sand over coarse sand over fine soil. The wall of the column was provided with a series of adjustable ports in order to allow experiments either with or without lateral air entry. The local soil air pressure can be significantly different from the external atmospheric pressure, for example +50 mbar for rain with an intensity of 3 cm/hr or -15 mbar for gravity drainage. The water flow depends not only on the boundary conditions in terms of water content and water pressure, but also is strongly dependent on air pressure conditions. Air pressure must be taken into account when determining the soil water suction, and flow equations must be written in terms of two-phase immiscible fluid flow. (See also W74-12811) (Knapp-USGS)
W74-12833

IMBIBITION IN FLOW OF TWO IMMISCIBLE LIQUIDS THROUGH A CRACKED POROUS MEDIUM WITH SMALL VISCOSITY DIFFERENCE,
J. V. Regional Coll. of Engineering and Technology, Surat (India). Dept. of Applied Mathematics.
For primary bibliographic entry see Field 2F.
W74-12834

UNSATURATED FLOW OF WATER IN ANISOTROPIC POROUS MEDIA,
National Council for Scientific Research, Lusaka (Zambia).
J. Cisler.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Poro Media, August 7-11, 1972, Guelph Univ, Ontari International Association for Hydraulic Researc and International Society of Soil Science Joi Pub, Vol 1, p 403-412, 1972. 12 ref.

Descriptors: *Unsaturated flow, *Porous medi *Anisotropy, *Hydraulic conductivity, Soil wat movement, Moisture content, Permeameters.

The hydraulic conductivity tensor for unsaturat anisotropic porous media has in general nine coe ficients and all of them are functions of moistu content or capillary pressure. There is no eviden that the conductivity tensor is symmetric as is th for saturated flow. The conditions necessary f the transformation of the general flow equati into the orthotropic form for the case of tw dimensional gravity and hysteresis-free form a expressed in the terms of directional conducti ties. A simple method is proposed to determine e perimentally the main and the cross coefficients the conductivity tensor as functions of capilla pressure. (See also W74-12811) (Knapp-USGS)
W74-12835

STEADY STATE POTENTIAL PROFILES LAYERED POROUS MATERIALS,
Iranian Plan and Budget Organization, Tehra Technical Bureau.
For primary bibliographic entry see Field 2F.
W74-12836

A VERSATILE SOIL WATER FLUX METER,
Agricultural Research Service, Madison, Wis. S and Water Conservation Research Div.
C. Dirksen.
In: Proc of 2nd International Symposium on Fu damentals of Transport Phenomena in Poro Media, August 7-11, 1972, Guelph Univ, Ontari International Association for Hydraulic Researc and International Society of Soil Science Joi Pub, Vol II, p 425-442, 1972. 3 fig, 2 tab, 9 ref.

Descriptors: *Soil water movement, *S moisture meters, *Flow measurement, Instrume tation, Permeameters, Flow rates, Flowmeters. Identifiers: Soil water flux meter.

A flux meter was developed to measure soil wat fluxes ranging from 0.11 cm/day to 1.43 cm/da Water is intercepted through a filter plate, f through a fine metering valve and distributed ba into the soil through another filter plate. T setting of the valve is changed until the tot hydraulic head loss across the meter is equal that measured over an equal distance undisturbed soil nearby. In this way the flu through the meter is made equal to that throu the soil, independent of the magnitude of the flu and soil type. This nearly eliminates the need f calibration. The flux through the meter is deriv from the measured hydraulic head loss across t valve and a calibration curve which relates the flu per unit hydraulic head loss to the valve settin This meter can be installed from a direction pe pendicular to the direction of flow. This keeps t disturbance of soil and flow field to a minimum. spring pushes the filter plates against undisturbe soil to minimize contact resistances. This devic can also be used as an in-situ hydraulic conductiv ty meter. (See also W74-12811) (Knapp-USGS)
W74-12837

DYNAMIC MEASUREMENT OF HYDROLOGI PROPERTIES OF A LAYERED SOIL DURIN DRAINAGE AND EVAPORATION, FOLLOWE BY WETTING,
British Columbia Univ., Vancouver. Dept. of So Science.
T. L. Chow, and J. de Vries.
In: Proc of 2nd International Symposium on Fu damentals of Transport Phenomena in Porou Media, August 7-11, 1972, Guelph Univ, Ontari

ternational Association for Hydraulic Research
d International Society of Soil Science Joint
b, Vol II, p 443-460, 1972. 6 fig, 1 tab, 42 ref.

scriptors: *Soil water movement, *Infiltration, ysteresis, Moisture content, Hydraulic conduc-ity, Anisotropy, Evaporation, Wetting.

il hydrologic properties for an undisturbed ered soil for the range between -0.1 and -90 bars re inferred from measurements of water con-t and water potential as functions of time and pth during water flow induced by drainage and aporation, followed by wetting. No properties owed system dependence. Both water content d hydraulic conductivity showed hysteresis tween -0.1 and -3 bars. Water content showed no steresis at less than -3 bars, whereas hydraulic nductivity showed inconclusive hysteresis in s range. Hydraulic conductivity displayed steresis in the medium water content range, but ne at high water contents. Both Darcy's law and diffusion theory as applied to transient vertical w of water in an undisturbed layered soil are id. (See also W74-12811) (Knapp-USGS)
74-12838

OW LAWS FOR PSEUDOPLASTIC INJEC-ON FLUIDS (CLAY SUSPENSIONS) IN RAVEL,
rlsruhe Univ (West Germany). Institut fuer denmechanik und Felsmechanik.
r primary bibliographic entry see Field 2F.
74-12839

E COMBINED STUDY OF SEEPAGE PRO-RTIES OF SEMIPERMEABLE SOILS FOR TIMATING INTERRELATIONSHIP OF UIFERS,
oscow State Univ. (USSR). Surface and Ground ters Interrelationship Lab.
r primary bibliographic entry see Field 2F.
74-12841

ING POTENTIAL FLOW THEORY TO TERMINE SOIL MOISTURE DISTRIBUTION OUT AN ISOLATED TREE,
rthern Forest Research Center, Edmonton berta).
R. Hillman.
Proc of 2nd International Symposium on Fun-nentals of Transport Phenomena in Porous edia, August 7-11, 1972, Guelph Univ, Ontario: ernational Association for Hydraulic Research l International Society of Soil Science Joint b, Vol II, p 514-535, 1972. 6 fig, 4 tab, 7 ref.

scriptors: *Soil water movement, *Trees, *Soil isture, *Soil-water-plant relationships, Root tems, Model studies, Root zone, Canada, owpacks, Infiltration, Water balance.
ntifiers: *Forest hydrology.

single tree, extracting water from the soil, is as-ned to act as a line sink. The tree-soil moisture tem is considered to be analogous to a well-undwater system for which the drawdown pat-n is axially symmetric. The study includes con-ions ranging from very wet to dry, following a ing cycle. Diagrams showing equipotential lines soil water determine directions of water move-nt and locate sources and sinks. Soil water dis-ution patterns are considerably more complex n hypothesized, and it is inferred that several rces and sinks may exist together in the soil ofile in the vicinity of the tree. (See also W74-11) (Knapp-USGS)
74-12842

DRODYNAMIC REGIMES OF SUBSURFACE TURN FLOW,
ward Univ., Washington, D.C. Dept. of Civil gineering.
L. Yen.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 556-565, 1972. 4 fig, 3 tab, 5 ref.

Descriptors: *Return flow, *Infiltration, *Percolation, *Anisotropy, *Soil water movement, Mathematical models, Numerical analysis, Recession curves, Subsurface runoff, Base flow.

Recession hydrographs of quick return flow from highly permeable top soil were obtained by solving linearized equations of motion and continuity. The results indicate the existence of different flow regimes, each identifiable with a hydrodynamically distinct zone of soil. When conditions are such that the governing equations cannot be linearized, numerical solution indicates that an additional regime appears at the beginning of a recession hydrograph. The recession coefficients for various regimes, with interlayer percolation, differ appreciably from those without interlayer percolation. (See also W74-12811) (Knapp-USGS)
W74-12843

VARIATION OF GROUND WATER DISCHARGE ZONE AS A FUNCTION OF INFILTRATION RATE,
Tehran Polytechnic (Iran). Civil Engineering Inst.
For primary bibliographic entry see Field 2F.
W74-12844

TRANSPORT PHENOMENA CONTROLLING EVAPORATION FROM SOIL,
Department of Agriculture, Ottawa (Ontario). Soil Research Inst.
For primary bibliographic entry see Field 2D.
W74-12845

EFFECT OF SOIL SALINITY ON THE RATE OF EVAPORATION,
Baghdad Univ. (Iraq). Coll. of Agriculture.
A. Hardan, and A. N. Al-Ani.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 574-581, 1972. 2 fig, 1 tab, 10 ref.

Descriptors: *Evaporation, *Soil moisture, *Salinity, Sulfates, Chlorides, Bicarbonates, Sodium, Calcium, Moisture content, Soil chemical properties.
Identifiers: *Soil salinity.

Salinization of bare soil from a shallow-saline water table was simulated under greenhouse conditions. Constant concentrations of single salts and mixtures of constant Ca:Mg:Na ratio with various Cl:SO4 ratios were used to maintain a constant water table in undisturbed nonsaline columns. The rate of evaporation decreased as the concentration of salts at soil surface increased. The decrease in evaporation rate for single salt treatments was in the order NaHCO3 greater than Na2SO4 greater than NaCl greater than CaCl2, up to an Ece of 5 mmhos/cm. Between ECe values of 6 to 14 mmhos/cm, the order of decreased evaporation rate was NaCl greater than Na2SO4 greater than CaCl2. Water content of the surface soil at the termnation of the experiment was in the order NaHCO3 less than Na2SO4 less than sulfates less than NaCl less than chlorides less than CaCl2. (See also W74-12811) (Knapp-USGS)
W74-12846

MODEL RESEARCH INTO THE SPEED AND HEIGHT OF CAPILLARY INFILTRATION IN SOME SOILS WITH TWO LEVELS OF MOISTURE,
Szkola Glowna Gosodarstwa Wiejskiego, Warsaw (Poland). Inst. of Crop Production.
S. Trzecki.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 582-592, 1972. 12 fig, 2 tab, 9 ref.

Descriptors: *Infiltration, *Antecedent moisture content, *Soil structure, Capillary conductivity, Capillary action.

Capillary infiltration, its height, speed, and amount of infiltrated water were studied for 4 soil structures at 2 levels of moisture content. One of the most important factors influencing the speed and depth of infiltration is capillary diameter, which depends on the mechanical composition of the soil and its bulk density. Infiltration also depends on the temperature of the soil and its moisture. (See also W74-12811) (Knapp-USGS)
W74-12847

COUPLING BETWEEN TRANSPORT PROCESSES IN POROUS MEDIA,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soil Science.
For primary bibliographic entry see Field 2F.
W74-12848

PHYSICO-CHEMICAL AND MICROBIAL REACTION EFFECTS ON TRANSPORT IN POROUS MEDIA,
Wisconsin Univ., Madison. Dept. of Soils.
For primary bibliographic entry see Field 5B.
W74-12850

THE INFLUENCE OF WATER TRANSPORT AND TRANSFER OF HEAT BY FREEZING AND DEFROSTING ON SOIL GENESIS,
Akademiya Nauk SSSR, Moscow. Institut Agrokhimii i Pochvovedeniya.
O. V. Makeev, and V. I. Dugarov.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 699-712, 1972. 6 fig, 7 ref.

Descriptors: *Frost, *Frozen soils, *Soil water movement, Freezing, Thawing, Mass transfer, Heat transfer, Soil formation.
Identifiers: *USSR(Siberia).

Soil cryogenesis is the whole complex of processes which take place in soil at low temperatures. The main cryogenic processes include migration of moisture and transfer of heat by freezing and thawing. These processes are illustrated in soils of East Siberia. (See also W74-12811) (Knapp-USGS)
W74-12852

EFFECT OF MICROBIOLOGICAL PROCESSES ON PERCOLATION OF WATER THROUGH SOIL,
Gruzinskii Nauchno-Issledovateslkii Institut Gidrotekhniki i Melioratsii. Tiflis (USSR).
Ts. E. Mirtskhulava, G. B. Abelishvili, and M. N. Terletskaya.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 713-721, 1972. 7 ref.

Descriptors: *Soil water movement, *Biochemistry, *Soil formation, Permeability, Soil management, Soil dispersants, Soil conservation, Microbiology.
Identifiers: Gley soils.

The microbiological processes taking place in soil influence its hydrologic properties. The activities of anaerobes cause chemical reduction processes which result in gleization of soils accompanied by increase of dispersion and plasticity and decrease of their permeability. Artificial gleization of soil is induced by means of a screen made of some vegetable substance; this substance is spread as a layer over the area where gleization is desired, and superimposed with another layer of ordinary earth for protection. As this screen is saturated with water, the anaerobes present in the vegetable screen and responsible for soil gleization begin to develop, and the gleization process proliferates deeper and deeper into the underlying soils in the direction of flow. (See also W74-12811) (Knapp-USGS)
W74-12853

SOLUTE TRANSPORT IN AGGREGATED SOILS: TRACER ZONE SHAPE IN RELATION TO PORE-VELOCITY DISTRIBUTION AND ADSORPTION,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 5B.
W74-12855

A NEW METHOD FOR DETERMINING AND INTERPRETING DISPERSION COEFFICIENTS IN POROUS MEDIA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 2F.
W74-12856

CALCIUM CARBONATE EQUILIBRIA IN SOILS AND IN IRRIGATION WATERS,
New Mexico State Univ., Las Cruces. Dept. of Agronomy.
G. A. O'Connor.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 281, $3.25 in paper copy, $2.25 in microfiche. New Mexico Water Resources Research Institute, Las Cruces, Report 041, July 1974. 21 p, 4 fig, 2 tab, 19 ref. OWRT A-048-NMEX(1).

Descriptors: *Calcium carbonate, *Aqueous solutions, *Equilibrium, Chemical properties, Thermodynamic behavior, *Soils, Ions, *Model studies.
Identifiers: *Irrigation water degradation, *Ion pairs, Activity coefficients, Kisp values.

Irrigation water degradation is of the utmost interest to water and soil scientists yet meaningful and accurate equations to describe the equilibria of one of the most important solid phases controlling water quality, calcium carbonate, are lacking. The objectives of this research were to: (1) develop a model capable of describing carbonate equilibria in aqueous systems open to the air, and (2) test the model against data for aqueous and soil-water systems. A chemical model was developed that adequately described calcite equilibria over a range of ionic environments that have practical significance to water and soil scientists. The model includes equations to account for activity coefficient and ion-pair effects, and was verified utilizing data from the literature for aqueous systems open to the air. (Hain-New Mexico State)
W74-12862

THE SOIL AS A PHYSICAL FILTER,
Robert S. Kerr Water Research Center, Ada, Okla.
For primary bibliographic entry see Field 5D.
W74-12872

THE SOIL AS A CHEMICAL FILTER,
Michigan State Univ., Lansing. Dept. of Crop and Soil Sciences.
For primary bibliographic entry see Field 5D.
W74-12873

THE SOIL AS A BIOLOGICAL FILTER,
Ohio State Univ., Columbus. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12874

RENOVATING SECONDARY EFFLUENT BY GROUNDWATER RECHARGE WITH INFILTRATION BASINS,
Agriculture Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W74-12877

EFFECTS OF LAND DISPOSAL OF WASTEWATERS ON SOIL PHOSPHORUS RELATIONS,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12880

EFFECTS OF LAND DISPOSAL OF WASTEWATER ON EXCHANGEABLE CATIONS AND OTHER CHEMICAL ELEMENTS IN THE SOIL,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12881

FACTORS AFFECTING NITRIFICATION-DENITRIFICATION IN SOILS,
California Univ., Davis. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 5D.
W74-12882

BIOTOXIC ELEMENTS IN SOILS,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12883

MICROBIAL HAZARDS IN DISPOSING OF WASTEWATER ON SOIL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12884

EFFECT OF FLOODING AND CROPPING ON THE CHANGES IN THE INORGANIC PHOSPHATE FRACTIONS IN SOME RICE SOILS,
University of Agricultural Sciences, Mandya (India). Regional Research Station.
M. A. Singlachar, and R. Samaniego.
Plant Soil. Vol 39, No 2, p 351-359. 1973. Illus.

Descriptors: *Soils, Crops, *Rice, Flooding, *Phosphates, Fertilizers, *Crop response.

Greenhouse experiments were conducted to evaluate the significance to flooded rice of the various forms of inorganic soil phosphate on Aborlan, Luisiana and Pili (Philippines) soils with and without phosphate. Changes in the various inorganic soils phosphate fractions with time under cropped and uncropped conditions were measured. The iron phosphate fraction was the most important source of phosphate to the rice plant. Phosphate added to the soils was slowly converted into the iron phosphate form. Transformation of soil phosphate seemed to be greatly affected by the presence of plant roots. Changes in the phosphate fractions were marked in the cropped soils.--Copyright 1974, Biological Abstracts, Inc.
W74-12925

REMOTE SENSING OF THE MOISTURE CONTENT OF THE ATMOSPHERE AND UNDERLYING SURFACE,
For primary bibliographic entry see Field 7B.
W74-12982

STEADY FLOW PATTERNS IN SATURATED AND UNSATURATED, ISOTROPIC SOILS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
P. A. C. Raats.
Journal of Hydrology, Vol 21, No 4, p 357-369. 1974. 3 fig, 1 tab, 17 ref.

Descriptors: *Soil water movement, *Flow system, *Saturated flow, *Unsaturated flow, Isotropy, Heterogeneity, Conductivity, Hysteresis, Darcys Law, Hydraulic conductivity, Velocity, Soils, Pressure head.
Identifiers: *Physical-mathematical model, Soil-atmosphere interface, Flow patterns, Tangent vector field, Streamlines.

A comprehensive analysis of steady flow patterns in saturated and unsaturated, possibly heterogeneous, isotropic soils is presented. At any point, the divergence of the unit tangent vector field to the streamlines is equal to the directional derivative along the streamlines of the orthogonal cross-sectional area of an infinitesimal stream tube divided by that area and also equal to the mean curvature of the surface of constant total head. Expressions are derived for the distribution of the flux, the water content, the velocity, the hydraulic conductivity, the total head, and the pressure head along a stream line or an infinitesimal stream tube. Among the results are a simpler derivation, further interpretation, and extension of earlier work on calculating the hydraulic conductivity distribution from detailed measurements of the total head distribution in combination with measurements of the hydraulic conductivity at a few locations. The jumps of various quantities at an interface also are discussed. (Schicht-ISWS)
W74-13007

ANOMALOUS TRANSMISSION OF WATER THROUGH CERTAIN PEATS,
Dundee Univ. (Scotland). Dept. of Biological Sciences.
For primary bibliographic entry see Field 2F.
W74-13014

THE INFLUENCE OF SOIL CONDITIONERS ON STRUCTURE AND YIELDS IN HORTICULTURAL SUBSTRATES, (IN GERMAN),
For primary bibliographic entry see Field 3F.
W74-13022

A PROPOSED INTERIM STANDARD FOR PLUTONIUM IN SOILS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5B.
W74-13136

THE MATHEMATICAL MODELING OF SOIL WATER-NITROGEN PHENOMENA,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-13138

RECLAMATION STUDIES ON BLACK MESA,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 5G.
W74-13144

NITROGEN FERTILIZATION OF FODDER SORGHUM M. P. CHARI (SORGHUM

OLOR) GROWN UNDER RAINFED CONDI-
ONS,
ian Grassland and Fodder Research Inst., Jhan-

primary bibliographic entry see Field 3F.
4-13146

PLICATION OF RED-LEAD TO THE DE-
CTION OF DISSOLVED SULFIDE IN
TERLOGGED SOILS,
versidade Federal da Bahia, Salvador (Brazil).
t. of Geosciences.
U. Wiedemann.
flanzenernaehr Bodenkd. Vol 133, No 1/2, p
31. 1972. Illus.

scriptors: *Aquatic soils, *Non-destructive
s, Testing, Analytical techniques, Sulfides,
ad, Soil profiles, Estuaries, Georgia,
tersheds, Aquatic plants, Chemical analysis,
shwater marshes, Sediments.
ntifiers: Redhead, Spartina-alterniflora, Spar-
grass, Marsh soils.

simple, inexpensive and non-disruptive
nique for the detection and localization of dis-
ed sulfide in wet, waterlogged, and submerged
s was designed. Rods or sheets of inert material
painted with red-lead (Pb3O4), inserted into a
, and exposed to it for 4 wk. Sulfide ions react
h lead to form black lead sulfide (PbS). A black-
red chemograph develops which accurately de-
ts the distribution of sulfide production in rela-
to the soil profile. Some deductions about a
nber of chemical parameters of the soil, include
, redox potential, and the state of Mn and Fe
be made from the reaction of the lead com-
nds. The technique was used to determine sul-
production in the bottom sediment of a fresh-
ter pond and was employed successfully in a
dy of different tidal marsh soils in an estuarine
tershed on the coast of Georgia. Poorly drained
s, occupied by a dwarf form of Spartina alter-
ora, were shown to have low redox potentials
r--150 mV and high sulfide content. They could
distinguished from better-drained soils with less
ctivity but high Fe mobility supporting a lush
wth of Spartina grass.--Copyright 1974, Biolog-
l Abstracts, Inc.
4-13161

LT PROFILES OF SOILS: INVESTIGA-
ONAL METHODS AND LEVEL OF SIG-
FICANCE: APPLICATION TO
LOMORPHIC SOILS IN SOUTHERN
ANCE (IN FRENCH),
titut National de la Recherche Agronomique,
ntpellier (France). Service d'Etudes des Sosl.
Servant.
n Agron (Paris). Vol 24, No 3, p 375-393. 1973.
s. English, German and Russian summary.

scriptors: *Soils, Europe, *Saline soils, Al-
ine soils, *Analytical methods, Halophytes,
il profiles, Salinity.
ntifiers: *France, Saline profiles, Sodic
onchak, Sward, *Halomorphic soils.

e saline profile is defined as a result of opposed
inization and desalinization processes. The
alytical approach is commented upon and some
ncepts relating to salt profiles are set forth:
tential, agronomical, upward or downward,
ghtly differentiated saline profiles. A number of
mmer time saline profiles are investigated in
lomorphic soils of Roussillon and Camargue
outhern France) by differentiating salt patches
cultivated land, coastal halophyte areas and
er salt depressions. Summer upward saline
files feature the barren soils of the salt patches
cultivated land and the very saline spots called
nsouire' in the halophyte Mediterranean coast
a. These soils are classified as sodic
lonchaks. The downward type of saline profiles
re noted in soils covered with dense vegetation
halophytic sward and in areas where surface drainage is poor, a typical example of which are the inner depressions in Roussillon. In these periodically flooded salt depressions the downward type of saline profile is a permanent feature and the soil evolving through desalinization is classified in the saline alkali group.--Copyright 1974, Biological Abstracts, Inc.
W74-13162

NITROGEN TRANSFORMATIONS AND AVAILABILITY OF AN ANAEROBICALLY DIGESTED SEWAGE SLUDGE IN SOIL,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5B.
W74-13163

ENVIRONMENTAL STATUS OF THE LAKE MICHIGAN REGION: VOLUME 9. SOILS OF THE LAKE MICHIGAN DRAINAGE BASIN--AN OVERVIEW,
Wisconsin Univ., Milwaukee. Dept. of Botany.
F. Stearns, F. D. Hole, and J. Klopatek.
Available from NTIS, Springfield, Va. 22161 as ANL/ES-40, Price $3.25 printed copy, $2.25 microfiche. Argonne National Laboratory, Illinois Report ANL/ES-40 (Vol 9), June 1974. 22 p, 1 fig, 1 tab, 28 ref. AEC Contract W-31-109-ENG-38.

Descriptors: *Soils, *Soil surveys, *Great Lakes region, *Lake Michigan, Land use, Environment, Urbanization, Cities.

Information on soils of the Lake Michigan drainage basin is summarized. Soil functions, morphology, classification, and land-capability scheme are described. Distribution of major soil groups is compiled for the basin area; the Podzols soil group is most abundant. The Brown Podzols account for about 46% of the basin area, and another 30% of the basin land is composed of Gray-Brown Podzols. Under favorable climatic conditions, forest land has been converted to agricultural land. However, forests appear to be prevalent and comprise the major land use of the basin soils. Agriculture ranks second. Increasing urbanization also has made its impact on soil use within the basin. In these urbanized areas soils are now covered largely by asphalt and concrete constructions. (Knapp-USGS)
W74-13169

EFFECTS OF RAINFALL AND DIFFERENTIAL APPLICATION OF N, P, K AND CA ON THE DOWNWARD MOVEMENT OF K IN AN AVALON MEDIUM SANDY LOAM CROPPED WITH MAIZE (ZEA MAYS L.),
Agricultural Research Inst., Cedara (South Africa).
M. P. W. Farina, and E. H. Graven.
Agrochemophysica. Vol 4, No 4, p 93-98. 1972, Illus.
Identifiers: Calcium, *Leaching, Nitrogen, Phosphorus, Potassium, Rainfall.

Soil and plant samples were obtained from a field experiment in which different levels of N, P, K and Ca were combined in a 34 factorial arrangement. The pattern of K movement in topsoil (0-15 cm) was measured over a period of 3 yr and related to rainfall and crop removal. The extent of K drainage to subsoil horizons over 2 seasons was determined and the effects of N, P, K and Ca levels on K movement to lower horizons assessed. Marked leaching of K from the surface horizon occurred. The extent of K loss of subsoil horizons was largely dependent upon rainfall and rate of K application and was unaffected by the addition of other fertilizers. Textural build-up prevented movement of K beyond the 45-60 cm zone. Although N and P had no direct effect on K movement to lower horizons, such losses were appreciably reduced by increases in plant uptake of K at high rates of N and P fertilization.--Copyright 1973, Biological Abstracts, Inc.
W74-13251

SPRING TIME SOWING OF PSAMMOPHYTES IN KARA KUM, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
M. Nurberdiev, G. Mukhammedov, and S. Bairamov.
Probl Osvoeniya Pustyn;. 2 p 67-71. 1973, English summary.
Identifiers: Kara-Kum, Soil moisture, *Psammophytes.

The success of reclamation developed in Kara kum depends on climatic conditions. The period for sowing plants is considered to be faavorable if the GPP (depth of soaked soil) reaches 60 cm to the end of Feb., and the amount of precipitation is not less than an average value (50-60mm). The best time for sowing of psammophytes is the beginning of spring, as soon as the daily average air temperature exceeds +5 degrees.--Copyright 1973, Biological Abstracts, Inc.
W74-13260

PLANTS AS INDICATORS OF HYDROLOGY AND LITHOLOGY IN THE ILI ANCIENT DELTA AREA, (IN RUSSIAN),
V. N. Ostrovskii.
Probl Osvoeniya Pustyn'. 3 p 43-48. 1973, English summary.

Descriptors: *Deltas, Vegetation, Groundwater, Petrology.
Identifiers: *Medication plants.

In the Ili ancient deltas (China, USSR) plant communities are used as the indicators of ground water depth, rate of ground water mineralization, annual amplitude of level changes and of surface soil thickness. The indicative value of certain plant communities is revealed with statistical treatment.--Copyright 1974, Biological Abstracts, Inc.
W74-13283

THE SEALING MECHANISM OF WASTE-WATER PONDS,
California Univ., Riverside. Dept. of Soil Science and Agriculture.
For primary bibliographic entry see Field 5D.
W74-13299

FEASIBILITY STUDY FOR THE ESTABLISHMENT OF DALMAJ PILOT PROJECT,
Institute for Applied Research on Natural Resources, Bagdad (Iraq).
For primary bibliographic entry see Field 3F.
W74-13346

VALUE OF SOIL CULTIVATION BETWEEN ROWS OF SUNFLOWER, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Maslichnykh i Efiromaslichnykh Kultur, Krasnodar (USSR).
P. G. Semikhnenko, and V. F. Baranov.
Dokl Vses Ord Lenina Akad S-kh Nauk Im V I Lenina, 10, p 8-9, 1972, Illus.
Identifiers: Herbicides, Sunflower, Treflan, *Soil moisture.

Cultivation of spaces between rows of sunflower plants at different depths up to 13 cm had little effect on the soil moisture content. The Kuban chernozem maintained an optimum density of 1.1-1.25 g/cm3. The application of the high-efficiency herbicide Treflan made cultivation of spaces between rows unnecessary.--Copyright 1973, Biological Abstracts, Inc.
W74-13351

HYDRIC CHARACTERISTICS OF PELOTAS SOILS, RIO GRANDE DO SUL, (IN PORTUGUESE),
Instituto de Pesquisas e Experimentacao Agropecuarias do Sul, Pelotas (Brazil).
E. I. G. Winkler, and W. J. Goedert.

Pesqui Agropecu Bras Ser Agron, 7, p 1-4, 1972, Illus. English summary.
Identifiers: *Brazil(Rio Grande do Sul), *Pelotas soils, *Soil moisture.

The relationship between soil moisture content and the tension in the various horizons of red-yellow podzol, planosol and gley soils was studied. Granulometric analysis was made and the distribution of pore spaces (total, noncapillary and capillary porosity) were determined. For each type of soil a characteristic moisture curve was obtained.--Copyright 1973, Biological Abstracts, Inc.
W74-13384

MODEL EXPERIMENTS SHOWING TRANSPORT OF FINE MATERIAL IN SOIL PORES (IN GERMAN),
Technische Universitaet, Munich (West Germany). Institut fuer Bodenkunde.
H. H. Becher, and K. H. Hartge.
Z Pflanzenernaehr Bodenkd. Vol 132, No 3, p 240-242. 1972. Illus. (English summary).
Identifiers: *Silt, Soil transport, *Soil Water Movement, *Model studies.

Experiments were conducted showing that silt translocation in a glass tube increased relative to water volume when the pressure gradient increased. The opinion, is confirmed that increasing velocity of water flux itself is a factor contributing to transport of material in unsaturated soils as compared to water-saturated situations.--Copyright 1973, Biological Abstracts, Inc.
W74-13402

AVAILABLE SOIL WATER: TIME-DISTRIBUTION IN A WARM SEASON RANGELAND,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
H. A. Schreiber, and N. G. Sutter.
J Hydrol (Amst). Vol 15, No 4, p 285-300. 1972. Illus.
Identifiers: Drought, *Evaporation, Grasses, Infiltration, *Soil moisture, Rainfall, Distribution patterns, *Soil water.

Daily total rainfall depths served as input to a computer program that estimated infiltration and subsequent evaporation. Printed output stated when a predefined start of the growing season occurred at Tombstone, Ariz., using official precipitation records from 1897 to 1970. The output listed moisture sequences by assigning a wet or dry status to the soil. The start of the growing season for perennial range grasses, defined as the presence of 4 consecutive days of wet soil, has occurred from June 8 to as late as early Sept, with a median start at July 14. The total number of wet days averaged 38 during the 4-mo period of June-Sept. Every year had at least 1 period of drought within the growing season; drought periods occurred an average of 6 times and could exceed 12. The average maximum dry period was 18 days; the corresponding wet period was 21 days. The starting wet period averaged 13 days and the ensuing dry period was 5 days. The maximum wet period tended to occur earlier in the season than the dry.--Copyright 1973, Biological Abstracts, Inc.
W74-13403

THE RELATION BETWEEN SOIL-WATER DIFFUSIVITY AND WATER CONTENT,
Technische Universitaet, Hanover (West Germany). Institut fuer Wasserwirtschaft und Landwirtschaftlichen Wasserbau.
P. W. Boochs, G. Battermann, and R. Mull.
Z Pflanzenernaehr Bodenkd. Vol 132, No 3, p 243-253, 1972. Illus. (English summary).
Identifiers: *Soil water movement, *Infiltration, *Diffusivity, Equations.

Moisture distribution as a function of time and distance were measured by X-ray absorption for fine sand, loess and clay. The diffusivities were determined by the method of Bruce and Klute or Whisler, Klute and Peters. The experimental diffusivities are approximated by an analytic expression. Using this expression the diffusivity equation is solved numerically and the horizontal water infiltration is described. A comparison between experimental data and computed curves shows a good agreement.--Copyright 1973, Biological Abstracts, Inc.
W74-13409

2H. Lakes

MORMON LAKE,
Arizona Academy of Science, Tempe.
For primary bibliographic entry see Field 6B.
W74-12784

BUILD-UP OF MINERAL CONTENT IN LAKE DARDANELLE AND THE EFFECT OF ZOOPLANKTON,
Arkansas Polytechnic Univ., Russellville. Dept. of Biological Science.
For primary bibliographic entry see Field 5C.
W74-12859

ANALYSIS OF NUTRIENT SUPPLIES FOR ALGAE IN ELEPHANT BUTTE RESERVOIR,
New Mexico Univ., Albuquerque. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-12861

NUTRITIONAL PATTERNS OF SOME BACTERIA ISOLATED FROM FRESH WATER,
Tennessee Univ., Martin.
J. N. Trentham.
J Tenn Acad Sci. Vol 48, No 1, p 9-12, 1973.

Descriptors: *Bacteria, *Amino acids, Nutrient requirements, Yeasts, Lakes, Tennessee, Vitamins.
Identifiers: Reelfoot Lake(Tenn).

The nutritional requirements of 250 heterotrophic bacterial isolates from the surface water of Reelfoot Lake, Tennessee (USA) were examined. Sixty percent of these grew on a glucose-salts medium. Fifty-seven of the auxotrophs were classified according to their organic growth factor requirements. The requirements of these isolates were distributed among nutritional classes as follows: amino acids, 22; vitamins, O; amino acids and vitamins, 21; and complex factors provided by yeast extract, 14. Ten isolates requiring amino acids as their only organic factors did not require specific amino acids, but grew well in the minimal medium supplemented with any one of several amino acids.--Copyright 1973, Biological Abstracts, Inc.
W74-12969

MIREX: AN UNRECOGNIZED CONTAMINANT OF FISHES FROM LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W74-12990

THE DEVELOPMENT FROM TWO-DIMENSIONAL TO THREE-DIMENSIONAL TURBULENCE GENERATED BY BREAKING WAVES,
State Univ. of New York, Albany. Dept. of Atmospheric Science.
U. Lemmin, J. T. Scott, and U. H. Czapski.
Journal of Geophysical Research, Vol 79, No 24, p 3442-3448, August 20, 1974. 10 fig, 9 ref. NOAA Contract 2-353388.

Descriptors: *Turbulence, *Energy, *Lake Ontario, *Current meters, *Velocity, *Waves(Water), Lakes, Reynolds number, Th
mocline, Epilimnion.
Identifiers: Energy spectrum, *Spectral analy
Wave number, Two-dimensional, Three-dim
sional, Kolmogorov's law, Coastal curre
Breaking waves.

An investigation was made of transition of the t
bulence spectrum within the mixed layer of L
Ontario following the passage of several w
defined meteorological disturbances. Obser
tions were taken during the summer of 1972 wit
ducted propeller current meter. Spectral analy
of the records revealed a transformation fro
spectral law corresponding to two-dimensio
turbulence into a wave number dependence c
responding to Kolmogorov's - 5/3 law indicat
three-dimensional structure. It was proposed t
this change over took place because of the
haustion of the energy source. The appearance
the recordings, the energy peaks and ene
levels, the mean velocities and the rms fluct
tions showed concomitant changes which
dicated that wave-generated turbulence may
transmitted downward in the epilimnion of lak
(Bhowmik-ISWS)
W74-12996

**A SURVEY OF THE ANIMAL COMMUNITY
THE MAIN POND AT CASTOR HANGLAN
NATIONAL NATURE RESERVE, NEAR PETE
BOROUGH,**
M. Palmer.
Freshwater Biol. Vol 3, No 4, p 397-407. 19
Illus.

Descriptors: *Aquatic animals, *Ponds, Ha
ness(Water), Analysis, National Wildlife Refug
Identifiers: *United Kingdom.

An account of the rich fauna of a pond in a ha
water district is given. A comparison is made w
the fauna of Hodson's Tarn, (United Kingdo
which contains soft water. Some attempt w
made to correlate the presence of various spec
with the environmental conditions provided by
pond.--Copyright 1974, Biological Abstracts, In
W74-12997

**METHYLMERCURY: BACTERIAL DEGRAD
TION IN LAKE SEDIMENTS.**
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 5B.
W74-13038

**ORGANOCHLORINE RESIDUES, MERCUR
COPPER AND CADMIUM IN YELLOW PERC
WHITE BASS AND SMALLMOUTH BAS
LONG POINT BAY, LAKE ERIE,**
Ontario Ministry of Natural Resources, P
Dover.
For primary bibliographic entry see Field 5C.
W74-13093

**ENVIRONMENTAL STATUS OF THE LA
MICHIGAN REGION, VOLUME 15. MAMMA
OF THE LAKE MICHIGAN DRAINAGE BASI**
Wisconsin Univ., Stevens Point. Museum of Na
ral History.
For primary bibliographic entry see Field 6G.
W74-13121

**CHARACTERISTICS OF BACTERIA
WATER LAYERS OF THE SOUTH BAIKAL, (
RUSSIAN),**
For primary bibliographic entry see Field 5B.
W74-13157

**LIMNOLOGICAL, ICHTHYOLOGICAL, AN
PARASITOLOGICAL INVESTIGATIONS O
ARKANSAS RESERVOIRS IN RELATION T
WATER QUALITY,**
Arkansas Univ., Fayetteville. Dept. of Zoology.

S. Carter, C. E. Hoffman, L. L. Olmsted, R. V. lambi, and D. G. Cloutman.
vailable from the National Technical Informa- n Service, Springfield, Va. 22161 as PB-236 680, .50 in paper copy, $2.25 in microfiche. Arkansas ater Resources Research Center, Fayetteville, mpletion Report, Publication, No 22, 1974. 272 34 fig, 40 tab, 97 ref. OWRT A-013-ARK(1).

escriptors: *Physicochemical properties, ytoplankton, Zooplankton, *Fish parasites, ass, Fisheries, *Fish food organisms, *Fish pulations, Environmental effects, Eutrophica- n, Fish predators, Oligotrophy, *Arkansas, servoirs, Water quality.
entifiers: *Diversity indices, Monomictic reser- irs.

irteen physico-chemical parameters and net nkton monitored indicated that Lake Fort ith is a warm monomictic, oligotrophic, rela- ely non-productive reservoir, which has shown le eutrophication since impoundment in 1936, d is an excellent soft-water supply. Species versity indices of helminth and crustacean rasites of selected game fishes revealed that ir parasite communities had reached climax. e combined effects of 13 physico-chemical fac- rs, age, and sex of the host accounted for less an 50% of the variance in abundance of fish rasites, with temperature and turbidity the most portant limiting factors. Seasonal changes in in- vidual diversity and community diversity of fish rasites seemed to be correlated mostly with tem- rature, dissolved oxygen, and turbidity. The ology of largemouth and spotted bass was stu- d including population dynamics. Feeding equency and mean diet weight were regressed on ven physico-chemical parameters and these rameters accounted for a larger percentage of riability in frequency of feeding than in mean et weight. Environmental factors were, there- re, particularly important in triggering feeding, t once feeding began the extent was determined factors such as prey density, predator-prey in- raction, and degree of satiation.
74-13167

NVIRONMENTAL STATUS OF THE LAKE ICHIGAN REGION: VOLUME 9. SOILS OF IE LAKE MICHIGAN DRAINAGE BASIN--AN VERVIEW,
isconsin Univ., Milwaukee. Dept. of Botany.
r primary bibliographic entry see Field 2G.
74-13169

TERNATIONAL FIELD YEAR FOR THE REAT LAKES,
ational Oceanic and Atmospheric Administra- n, Rockville, Md.
vailable from NTIS, Springfield, Va 22161 as OM-73-10914, Price $5.25 printed copy; $2.25 crofiche. International Field Year for the Great kes (IFYGL) Bulletin No 4, September 1972. 0 p.

escriptors: *Great Lakes, *Limnology, Hydrolo- , Meteorology, Reviews, Water balance, emote sensing, Water analysis, Data collections, ata processing, Canada, United States, Lake On- rio.

me preliminary results of the joint study by nada and the United States during the Interna- nal Field Year for the Great Lakes are esented. Aspects included are the atmospheric ater balance project, remote sensing, the inter- mparison study, the Niagara Bar icrometeorological Project, the Woodbridge adar Observing and Data Processing System, ta management, the thermal structure and heat ntent of Lake Ontario, lake levels, tasks and ojects of the U.S., and calibration, standardiza- n, and evaluation of chemical analyses. (Knapp-SGS)
74-13178

COMPARISON OF BACTERIAL AND PHYTOPLANKTON POPULATIONS UNDER NATURAL AND LABORATORY CONDITIONS,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 5C.
W74-13182

OBSERVATIONS ON PLANKTONIC DIATOMS IN THE LAKE-RIVER SYSTEM LAKE MJOSA-LAKE OYEREN-RIVER GLAMA, NORWAY,
Norsk Institutt for Vannforskning, Blindern.
E. A. Lindstrom, R. Skulberg, and O. M. Skulberg.
Norw J Bot. Vol 20, No 2/3, p 183-195. 1973.

Descriptors: *Plankton, *Diatoms.
Identifiers: Asterionella-formosa, Diatoma-elongatum, Diatoms, Fragilaria-crotonensis, Glama, Lake, Melosira-italica-ssp-subarctica, Mjosa, Norway, Oyeren, Periodicity, Planktonic, Rhizosolenia-eriensis, River, Seasonal, System, Tabellaria-fenestrata-var-asterionel, Lake Mjosa(Norway), Lake Oyeren(Norway), *Norway.

The planktonic vegetation of diatoms in the lake-river system Lake Mjosa-Lake Oyeren-River Glama has been observed extensively since 1958. The general features of diatom development are reported. The diatom vegetation is a coherent and continuous phenomenon revealing a fairly well-defined seasonal periodicity. Asterionella formosa Hass., Fragilaria crotonensis Kitton, Diatoma elongatum (Lyngb.) C. A. Ag., Tabellaria fenestrata var. asterionelloides Grun., Rhizosolenia eriensis H. L. Smith and Melosira italica ssp. subarctica O. Mull. are dominant species. The results of the survey are compared with results from previous investigations of Lake Mjosa, and changes which have taken place are noted. F. crotonensis is a newcomer to the plankton, at least as a predominant species.--Copyright 1974, Biological Abstracts, Inc.
W74-13341

THE DESMIDS OF THE HALOPLANKTON OF LAKE VALENCIA, VENEZUELA, (IN GERMAN),
K. Foerster.
Int Rev Gesamten Hydrobiol, Vol 57, No 3, p 409-428, 1972. English summary.
Identifiers: Cosmarium, Desmids, Membranes, New, Plankton, Species, Subspecies, Temperature, Valencia, Venezuela, *Haloplankton, Lake Valencia.

Lake Valencia is without an outlet, and it has a salinity of 0.6%, the main ions being SO4(-2) and HCO3(-3). The surface temperature varies from 27-31C. It is highly eutrophic. There are few desmids, and those species that occur are not abundant. Fifteen species were identified, of which Cosmarium moniliforme subelongatum and C. pustulatum are new. C. calcareum Wittrock spetsbergense is a new combination replacing C. subcostatum Lundell spetsbargense Borge. Evidently as an adaptation to the saline conditions, some species show an enlargement of the cells; and the membranes of the cells are thickened.--Copyright 1973, Biological Abstracts, Inc.
W74-13353

SEASONAL VARIATIONS IN THE DIET OF ANATIDAE IN THE GORKI WATER STORAGE BASIN, (IN RUSSIAN),
Gorkii State Univ. (USSR).
A. V. Molodovskii.
Vestn Zool, Vol 7, No 2, p 70-76, 1973. English summary.
Identifiers: *Anatidae, Gorki basin, *Bird diet.

The seasonal character of a nutrition change in 14 spp. of Anatidae was studied in the lake part of the water storage basin and its Unzhenian and Nemdskian spurs (USSR) in 1959-1964. Content of 326 stomachs was investigated in adult and young flying birds. The volume of different groups of Anatidae fodder was estimated by sight. The estimation showed that selectivity of fodder in Anatidae of different species was manifested in distinctly expressed seasonal alternation of different groups of food. Abundance and accessibility of most fodder kinds depends on seasonal and annual regularities of their maturation and water level in the water storage basin.--Copyright 1973, Biological Abstracts, Inc.
W74-13354

LARGE ECOLOGICAL ZONES OF LAKE CHAD, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort-Lamy (Chad).
J.-P. Carmouze, C. Dejoux, J.-R. Durand, R. Gras, and A. Iltis.
Cah O R S T O M Ser Hydrobiol, Vol 6, No 2, p 103-169, 1972, Illus. English summary.
Identifiers: Ecological studies, Africa, Hydrology, Insects, Macrophytes, Plankton, Snails, *Chad(Lake Chad).

Climate, geomorphology, hydrology, water physics and chemistry are discussed. The main distribution areas are analyzed for: phytoplankton, macrophytes, zooplankton, oligochaetes, insects, snails and fish. For every group, a marked difference appears between northern and southern parts of the lake (Central Africa). The south is greatly disturbed by the flow of the Chari and is, to a certain extent, similar to the river system. The northern part is more steady and represents the lake stricto sensu. It was not possible to draw up a general zonation although factors such as water depth, landscape (open water, archipelago) or bottom deposits are certainly important ones. Some organisms are missing or rare beyond certain levels in water conductivity: Oligochaeta (Alluroidiae), benthic snails (except Malania) and fishes (mainly Mormyridae). Quest for food does not seem to be of great importance in fish distribution. Several examples derived from Macrophytes, zooplankton, snails and fish show that deep changes have occurred from 1965-1972. At the present time, the lake level is 2.5 m below the 1965 leve, causing great changes associated with shallowness.--Copyright 1973, Biological Abstracts, Inc.
W74-13356

FIELD STUDIES ON THE GONOTROPHIC CYCLE OF AEDES AEGYPTI IN BANGKOK, THAILAND,
World Health Organization, Bangkok (Thailand). Aedes Research Unit.
C. P. Pant, and M. Yasuno.
J Med Entomol, Vol 10, No 2, p 219-223, 1973.
Identifiers: *Aedes aegypti, Arbovirus, Dengue, Fever, *Thailand(Bangkok), *Mosquitoes.

The gonotrophic cycle of A. aegypti, the principal vector of dengue hemorrhagic fever, was studied during the wet, cool-dry, and hot seasons in Bangkok using a technique of release and recapture of mosquitoes of known age and physiological condition. During the cool-dry season there was a delay of 1-2 days, in comparison with the other seasons, before the mosquitoes took their 1st blood meal. The duration of the gonotrophic cycle during the hot season was 3 days. The delay in taking a blood meal during the cool-dry months reduces the degree of man-mosquito contact and consequently the vectorial capacity of the mosquito. The implications of the findings on the strategy of control operations against adult mosquitoes are discussed.--Copyright 1974, Biological Abstracts, Inc.
W74-13365

LAKE BULL TROUT,
Polskie Towarzystwo Przyrodnikow im. Kopernika, Krakow.
Z. Wajdowicz.

Wszechswiat, 1, p 15-17, 1973, Illus.
Identifiers: *Poland(Lake Bull), Salmo-Salar, Salmo-Trutta, *Trout.

A general description of fish belonging to the Salmonidae is given, including notes on the natural conditions necessary for their propagation and development. Two species belonging to the genus Salmo are or were known to occur in Poland, Salmo salar and Salmo trutta; however, both are rapidly disappearing due to the progressing pollution of river waters. Efforts have been undertaken to adapt the lake bulltrout (Salmo trutta m. lacustris), occurring hitherto only in the Wdzydzkie Lakes in Poland, to new biotopes. The 1st stage of acclimatization has now been concluded and has led to the successful stocking of an artificial basin formed by damming the Sola River with this subspecies. It is now planned that other sub-Carpathian lakes will be designated for the same purpose.--Copyright 1974, Biological Abstracts, Inc.
W74-13366

DATA ON THE BIOLOGY OF SELENGI OMUL JUVENILES COREGONUS AUTUMNALIS MIGRATORIUS (GEORGI), (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W74-13376

STUDIES ON BIOLOGY OF MASTACEMBELUS PANCALUS (SPINY EEL, HAMILTON) IN ARTIFICIAL PONDS: I. NATURAL HABITAT, DISTRIBUTION, FOOD AND FEEDING HABITS, AND ECONOMIC IMPORTANCE,
Bangladesh Agricultural Univ., Mymensingh. Dept. of Agricultural Management.
A. M. Karim, and A. Hossain.
Bangladesh J Biol Agric Sci, Vol 1, No 2, p 10-14, 1972, Illus.
Identifiers: Diptera, *Eels, Habitats, *Mastacembelus, Ponds.

The results of a 12-mo. study of natural habitat, distribution, and food and feeding habits of M. pancalus in Ponds 2 and 4 of Bangladesh Agricultural University Campus, Mymensingh, are presented. The ponds have surface areas of 2.38 and 6.55 acres and maximum depths of 7.5 and 8.0 feet, respectively. These were practically devoid of aquatic vegetation except for a few water hyacinth in the water areas close along the banks. A total of 295 specimens (including post-larvae) of M. pancalus was collected from the ponds during the study period. The highest catch of fish was in May and the lowest in March and April. The percentage of male and female varied from 14.1-60.0 and from 15.5-57.1, respectively. In aggregate, the ratio of male to female was 50.27:49.73. Stomach content analysis indicated that M. pancalus lived on variety of food materials which included larvae of Lepidoptera, Diptera, Hemiptera, and sand grains and debris. In fact, sand grains and debris constituted about 57.54 percent of all food materials taken together.--Copyright 1973, Biological Abstracts, Inc.
W74-13387

RECONNAISSANCE LIMNOLOGY OF SUB-ANTARCTIC ISLANDS: I. CHEMISTRY OF LAKE WATERS FROM MACQUARIE ISLAND AND THE ISLES KERGUELEN,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
P. A. Tyler.
Int Rev Gesamten Hydrobiol, Vol 57, No 5, p 759-778, 1972, Illus.
Identifiers: Kerguelen island, Lakes, Limnology, Macquarie island, *Water chemistry, *Antarctic.

The plateau lakes of Macquarie Island and Kerguelen illustrate the dominant role of the sea in the chemistry of lakes on Sub-Antarctic islands. The salinity of the waters depends on distance from the coast in the direction of prevailing winds, and ionic composition points to sea spray as the major supplier of ions. Geochemical influence is slight but varies from lake to lake. The lake waters are soft, slightly-colored or colorless, and have a pH near neutrality or moderately acid.--Copyright 1973, Biological Abstracts, Inc.
W74-13389

MASS PRODUCTION OF ROTIFERS FOR THE CULTURE OF FISH AND SOME SHRIMP LARVAE (IN KOREAN),
Pusan Fisheries Coll. (Republic of Korea).
I. B. Kim.
Bull Kor Fish Soc. Vol 5, No 2, p 45-49. 1972. Illus. (English summary).
Identifiers: Brachionus, Chlorella, Daphnia, Filina, *Fish larvae, *Rotifera, Scendesmus, *Shrimp.

Outdoor concrete ponds, each 16 m2, were used to culture the rotifers, Brachionus calyciflorus and Filinia longiseta. B. calyciflorus usually attained the population of about 100 individuals/ml of pond water. Dipterex was usually applied to control Daphnia and other crustaceans that generally appear and feed on rotifers. A concentration of 0-16-0.2 ppm in the pond water was sufficiently effective to control these natural predators of rotifers. Poultry dung was very effectively used to culture rotifiers. The fertilization ratio was about 8 kg each pond with 30 cm depth of water. The tiny rotifier, F. longiseta attained a very high population density of about 1000 individuals/ml of pond water, but they were very sensitive to Dipterex, and for this aspect future investigation may be needed. In outdoor ponds, the multiplication of rotifiers significantly decreased when the water temperature falls to about 20C in autumn. In the laboratory, unicellular planktonic algae such as Scenedesmus or Chlorella, as the food of rotifers, were collected from the outdoor ponds by dipping them together with water, and were effectively used for the culture of B. calyciflorus. If the planktonic algae are cultured in specially designed containers, the sunlight would be the most effective means as the source of light. B. calyciflorus cultured in the outdoor ponds by the Dipterex controlled method was highly efficient to rear the early fry of marble gourami. The Dipterex content mixed in the water to control the crustacean predators of rotifers showed no harm to the gourami fish fry.--Copyright 1973, Biological Abstracts, Inc.
W74-13405

A STUDY ON THE GROWTH OF THE MUSSEL, MYTILUS EDULIS, IN A SALT-FIELD RESERVOIR (IN KOREAN),
Dong Kook Univ., Seoul (Republic of Korea).
C. Lee, Y. S. Ko, and J. K. Lee.
Bull Kor Fish Soc. Vol 5, No 3, p 71-75. 1972. Illus. (English summary).
Identifiers: *Lorea, *Mussels, Mytilus, *Growth rates, Hydrogen ion concentration, *Reservoirs(Salt-field).

The growth of the mussel, M. edulis, in a salt-field reservoir was investigated at Dangjin, Choongnam (Korea) from June-Oct. 1970. Temperature, salinity, specific gravity, and pH of water were 22.5-27.5C, 28.6-34.8%, 1.019-1.024, and 7.6, respectively in the salt-field reservoir from June 20 to July 19. Three species of Gastropoda and 7 spp. of Pelecypoda were collected. The shell height of the mussel group in the highest abundance increased from 200 mm (15 approx. 25 mm) on June to to 40 mm (20 approx. 50 mm) on Sept. 26 in the salt-field reservoir, whereas the average shell heights were 19.80 mm (June 15) and 35.10 mm (Sept. 26), respectively. The daily growth of the mussel from July 10 to Aug. 12 was 0.22 mm in shell height and highest during the experimental period. The relationships between shell length (L) and shell height (H), and between shell length (L) and shell breadth (B) of the young mussel are represented by the following equations respectively: H = 1.26776L + 5.07978, B = 0.35041L + 3.05502. From the above results, it is suggested that the culture of the mussel M. edulis, in a salt-field reservoir is possibl
Copyright 1973, Biological Abstracts, Inc.
W74-13406

STUDIES ON GULL LAKE, MICHIGAN: EUTROPHICATION: EVIDENCE AND PRO NOSIS,
University of East Anglia, Norwich (Englar School of Environmental Sciences.
For primary bibliographic entry see Field 5C.
W74-13456

THE RESPONSE OF LARVAE OF PERLA BU MEISTERIANA CLAASSEN (PLECOPTERA) VARIATIONS IN HYDROSTATIC PRESSUI (IN FRENCH),
Biological Research Station, Bacau (Rumania).
I. Miron.
Hydrobiologia. Vol 42, No 2/3, p 345-354, 19 Illus. English summary.

Descriptors: *Larvae, *Hydrostatic pressure, poundment.
Identifiers: Perla burmeisteriana, *Romania.

To explain the reactions of larvae of P. b meisteriana to an ecological change following impoundment of a man-made lake on River Bist za (Romania), some experiments on the respon of this species to variations of hydrostatic pr sure were undertaken. Experiments were carr out in Lake Bicaz France. Observations w direct, either by diving or by monitoring the sit tion visually from a submerged laboratory. Sets 40 specimens were exposed to pressure of 1, 1.5 2 atmospheres. Survival time of the lar decreased as pressure increased. T phenomenon is temperature dependent. Press influences gaseous exchange, by altering the r of elimination of CO2. This finally leads to hyp capnia.--Copyright 1974, Biological Abstracts, I
W74-13458

RECIPROCAL INFLUENCE OF LAR RESERVOIRS AND ADJACENT TERRITORI IN DIFFERENT NATURAL CONDITIONS THE USSR,
Akademiya Nauk SSSR, Moscow. Geologiches Institut.
For primary bibliographic entry see Field 5C.
W74-13466

CALAMOECIA LUCASI (COPEPODA, CAL NOIDA) AND OTHER ZOOPLANKTERS TWO ROTORUA, NEW ZEALAND, LAKES,
Waikato Univ., Hamilton (New Zealand). Sch of Science.
M. A. Chapman.
Int Rev Gesamten Hydrobiol. Vol 58, No 1, p 104, 1973. Illus.

Descriptors: *Zooplankton, *Lakes, Seasor *Copepods.
Identifiers: Lake Rotorua(NZ), Lake Rotoiti(N *New Zealand.

The seasonal cycles of the zooplankton in 19 1969 in Lake Rotorua and Rotoiti in the No Island of New Zealand are outlined. Bosm meridionalis had several peaks in abundance d ing the summer and low winter numbe Ceriodaphnia dubia had only a single period of r abundance during the summer. The rotifer planchna priodonta was present throughout year in low numbers except for 2 brief but strik peaks in the spring-summer period. The o cyclopoid copepod present was Macrocyclops bidus which was never abundant. The annual cles of the calanoid copepod Calamoecia luc were studied in some detail. Total numbers w high but very variable during spring-autumn low in winter, the seasonal cycles being v similar in both lakes. Breeding was continuc although egg clutches were small (1.1-6.6) and

velopment of at least 5 cohorts/yr could be fol-wed from data on breeding intensity, population e-structure and adult size. Laboratory deter-ined egg development rates were used to calcu-e birth rates in the populations so that produc-n and losses could be estimated. Survival rates ere higher in Rotoiti than in Rotorua. Birth and ath rates were low; the annual means for both ear and exponential rates ranged from 0.04 to 07 giving turnover times for individuals of 12-18 ys in Rotorua and 18-24 days in Rotoiti. Popula-n turnover rates were higher in Rotorua (19-28 ys) which had a similar population/sq m but gher clutch sizes than in Rotoiti (18 days).--pyright 1974, Biological Abstracts, Inc.
74-13467

VESTIGATIONS ON THE CATION-CON-NT IN A BOG: I. DIFFERENCES IN THE EGETATION-COMPLEXES, (IN GERMAN),
ankfurt Univ. (West Germany). Botanical Inst.
. Loetschert, and T. Gies.
ora (Jena). Vol 162, No 3, p 215-243, 1973. Illus.
nglish summary.

escriptors: Europe, *Bogs, Wetlands, Mosses, n, Aquatic plants, *Chemical analysis, Calcium, dium, Potassium, Magnesium, *Subsurface ters, Ions, Cations, Water analysis.
entifiers: Bog, Calcium, Cation, Fen, Galium-milum, Ion, Magnesium, Poa-chaixii, Potassi-n, Sodium, Sphagnum-cuspidatum, Vegetation, oors, *Germany.

e following plant communities were found in e bog-system of the Schwarze Moor in the Rhon-ountain, Germany: Fen: Galium pumilum--Poa aixii association, Nardo-Juncetum squarrosi, nco-Molinietum and Caricetum rostratae; ansitional fen: Carici canescentis-Agrostidetum ninae, Lycopodio-Betuletum pubescentis, lytrichum strictum- and Cladonia association d Piceetum; Bog: Sphagnum cuspidatum as-ciation and (=Caricetum limosae) Sphagnetum ropaeum rhoenanum. The Ca, Na, K and Mg ion ncentrations and the pH-values were analyzed the subsoil water of the plant communities dur-g 2 yr. The following ionic compositions are typi-l for the bog-system: Fen: pH = 4.9-6.3, Ca++ 3.0-10.0 mg/l, Na+ = 1.6-4.8 mg/l, K+ = 0.3-) mg/l, Mg++ = 1.6-4.0 mg/l; Transitional fen: H = 3.7-4.2, Ca++ = 0.9-2.0 mg/l, Na+ = 0.9-4 mg/l, K+ = 0.1-0.6 mg/l, Mg++ = 0.4-0.7 g/l; Bog: pH = 3.7-4.1, Ca++ = 0.6-1.2 mg/l, a+ = 0.7-1.3 mg/l, K+ = 0.15-0.4 mg/l, Mg++ 0.2-0.6 mg/l. The central bog plane was not in-ienced by miner l soil water. There were also no gher concentrations on places where species aracteristic for fen vegetation appeared. Statisti-l differences in concentrations of water samples the Sphagnetum fusci, Sphagnetum magellanici d the Sphagnetum tenelli were not found. The fferentiation of the Schwarze Moor in bog, nsitional fen and fen is the result of the topo-aphic conditions and the flow of soil water inerals. There is some influence in the dif-rentiation of the bog plant communities caused different concentrations of cations. A com-rison of known cation concentrations of Eu-pean bogs and the results found in the Schwarze oor shows that there are typical ionic concentra-ns in each European bog area. (See also W74-471)--Copyright 1974, Biological Abstracts, Inc.
74-13470

VESTIGATIONS ON THE CATION-CON-NT IN A BOG: II. SEASONAL CHANGES ND INFLUENCE OF THE SPHAGNUM EGETATION, (IN GERMAN),
ankfurt Univ., (West Germany). Botanical Inst.
Gies, and W. Loetschert.
ora (Jena). 162(3): 244-268. Illus, 1973, English mmary.

escriptors: Europe, *Bogs, Wetlands, Calcium, agnesium, Sodium, Potassium, Ion exchange, Cation exchange, *Subsurface waters, *Chemical analysis, Mosses, Aquatic plants, Water analysis.
Identifiers: Sphagnum, Sphagnum-spp, Vegetation, Moors, *Germany, Kolk, Flarks.

The Ca, Mg, Na and K-ion concentrations and the pH values were analyzed in 'kolk,', 'flarks' (bodies of water on the moor) and in the subsoil water of the Schwarze Moor in the Rhon-Mountain, Germany. The concentrations of the cations fluctuate more than previously found in Central European bogs. Low and high concentrations of the electrolytes may appear according to the different conditions of weather and cation exchange in the Sphagnum-plants at any time within the period investigated. An annual periodicity is not seen. The same amount of rain causes different concentrations of cations in the investigated areas according to the capacity and cation adsorption of the Sphagnum plants. The cation adsorption and the cation exchange of living Sphagnum-mosses are confirmed by measurements under natural conditions. There are great differences in the concentrations of cations in the neighborhood of Sphagnum-mosses, in the water between Sphagnum-plants and the concentrated solution pressed out of Sphagnum-plants. Cations are also increased in the heads of 'blutforming' (sporophyte formation) Sphagnum-mosses. It is significant for the ecology of the bogs that the Sphagnum-mosses are able to store more cations in their heads than they need for nutrition. Besides this, the Sphagnum-mosses lower the pH-value permanently by cation exchange. The changing concentrations in bog water are on the one hand the result of weather and on the other hand the result of cation exchange and wash out of accumulated cations of Sphagnum-mosses. (See also W74-13470)--Copyright 1974, Biological Abstracts, Inc.
W74-13471

LIMNOLOGICAL ASPECTS OF SOME MOROCCON ATLAS LAKES, WITH REFERENCE TO SOME PHYSICAL AND CHEMICAL VARIABLES, THE NATURE AND DISTRIBUTION OF THE PHYTO- AND ZOOPLANKTON, INCLUDING A NOTE ON POSSIBILITIES FOR THE DEVELOPMENT OF AN INLAND FISHERY,
Ghent Rijksuniversiteit (Belgium). Zoology Inst.
For primary bibliographic entry see Field 5C.
W74-13476

A CRITICAL STUDY OF METHODS IN NUMERICAL TAXONOMY: THE CLASSIFICATION OF AQUATIC BACTERIA, (IN FRENCH),
For primary bibliographic entry see Field 5C.
W74-13487

POPULATION DYNAMICS OF HATCHERY-REARED LANDLOCKED SALMON, SALMO SALAR, AT SCHOODIC LAKE, MAINE,
Maine Dept. of Inland Fisheries and Game, Augusta.
K. A. Havey, and P. S. Andrews.
Trans Am Fish Soc. Vol 102, No 4, p 728-738. 1973, Illus.

Descriptors: *Salmon, *Fish populations, *Maine, Fish hatcheries.
Identifiers: *Schoodic Lake(Maine), Salmo salar.

Landlocked salmon, Salmo salar, were introduced into Schoodic Lake, Washington, County, Maine, in 1960. From 1963-70, 9 groups of stocked salmon were studied to obtain information on survival, standing crops, the salmon sport fishery, and population density-catch relationships. Average survival from age I+ to age II+ (4 groups) was 47.9%, from age II+ to age III+ (5 groups) 53.1%, from age III+ to age IV+ (3 groups) 23.9% and from age IV+ to age V+ (4 groups) 14.2%. Few salmon survived beyond age V+. Annual survival, excluding fishing mortality, for 4 groups of young salmon ranged from 26.4%-61.6%. Survival from planting to 6 mo. at large for 1 group was 72.6%. Annual survival after death from all causes ranged from 17.6% for 1 group of salmon from III+ - IV+ to 73.1% for 1 group of salmon from II+ - III+. Numerical annual standing crops from 1964-69 computed by the Petersen method ranged from 4.0 plus or minus 1.0 - 13.8 plus or minus 2.0 fish per ha. Standing crops from 1964-69 ranged from 2.5 plus or minus 0.4 - 3.4 plus or minus 1.0 kg per ha. Catch/angler hour by sporting fishing ranged from 0.036 in 1969 to 0.229 in 1967. Annual mean number of salmon checked was 164. Salmon creeled averaged 38.6 plus or minus 0.5 cm in total length and 0.5 plus or minus 0.04 kg in weight. Based on an estimated 75.0% census, mean numerical yield was 1.4 fish/ha. Mean weight Yield, was 0.7 kg/ha. Of 12,107 salmon stocked, 8.6% were subsequently checked in angler's creels. Salmon stocked at ages I+, I, and 0+ yielded returns of 14.3%, 8.9%, and 5.4% respectively. Mean effort/ha/hear was 6.9 angler hours. There is a linear relationship (1964-69 data) between population density expressed as numbers/ha and numbers/ha captured by fall trap netting. There is also a linear relationship between population density expressed as numbers/ha and catch/angler hour of all salmon the following fishing season.--Copyright 1974, Biological Abstracts, Inc.
W74-13488

CANNIBALISM AS A FACTOR IN FIRST YEAR SURVIVAL OF WALLEYE IN ONEIDA LAKE,
J. R. Chevalier.
Trans Am Fish Soc. Vol 102, No 4, p 739-744. 1973, Illus.

Descriptors: *Walleye, *Fish mortality, *New York.
Identifiers: *Fish cannibalism, *Oneida Lake(NY).

The role of cannibalism in determining year class strength of walleyes in Oneida Lake, New York, was evaluated. From mid-July 1969-May 1970, the abundance of young walleyes was monitored by trawling and the stomachs of adult walleyes collected in trawls and gill nets were examined. Number of young walleyes consumed was estimated from occurrence in adult walleye stomachs, digestion rates and estimated number of adults. Daily consumption ranged from 0.044 young walleys/adult in Aug. to 0.002 in winter. Monthly cannibalism, estimated by the multiplication of daily consumption by the number of days and the number of adult walleyes, varied from 1,053,000 young in Aug. to 240,000 in winter. Cannibalism declined proportionally with abundance of young walleyes. Overwinter mortality rates in 1969-1970 were highest for small young-of-the-year walleyes because adult walleyes were size-selective in preying upon young.--Copyright 1974, Biological Abstracts, Inc.
W74-13489

CONTRIBUTION TO THE GROWTH OF THE BEAM, ABRAMIS BRAMA (LINNAEUS, 1758) (OSTEICHTHYES, CYPRINIDAE) IN THE SLAPY WATER RESERVOIR, BETWEEN 1957 AND 1965,
J. Poupe.
Vestn Cesk Spol Zool, Vol 37, No 2, p 104-109, 1973, Illus.

Descriptors: *Benthos, *Reservoirs, Biomass, *Growth rates.
Identifiers: *Abramis-brama, *Bream, *Czechoslovakia(Slapy Valley reservoir).

The growth of the Bream, Abramis brama in the Slapy Valley Reservoir in Bohemia, south of Prague, Czechoslovakia was studied. The growth was evaluated according to samples collected in the years 1957-1958 and 1963-1965. A total of 707 specimens were examined. Those factors (commercial fishing, decreased benthic biomass due to cold water in flow and water level fluctua-

tions, winter suffogation under ice and angling) which could influence the growth not only in the years 1957-1965, but up to the year 1970, are taken into account. In the course of the period under review the growth was retarding.--Copyright 1974, Biological Abstracts, Inc.
W74-13494

ALGAL ASSAYS OF ARCHIPELAGO WATERS: QUANTITATIVE ASPECTS,
Lantbrukshogskolan, Uppsala (Sweden). Institutionen for Vaxtfysiologi.
For primary bibliographic entry see Field 5C.
W74-13495

POTENTIAL PRODUCTIVITY OF AN ALPINE LAKE AS INDICATED BY REMOVAL AND REINTRODUCTION OF FISH,
British Columbia Univ., Vancouver. Inst. of Fisheries.
For primary bibliographic entry see Field 5C.
W74-13496

2I. Water In Plants

XYLEM SAP TENSION IN THREE WOODLAND OAKS OF CENTRAL CALIFORNIA,
California Univ., Carmel Valley. Hastings Natural History Reservation.
J. R. Griffin.
Ecology. Vol 54, No 1 p 152-159, 1973. Illus.

Descriptors: *Oak trees, *Xylem, Trees, Tension, Forests, California, Grasslands.
Identifiers: Quercus-agrifolia, Quercus-douglasii, Quercus-lobata, Sap.

In mid-Aug. bottomland Quercus agrifolia and Q. lobata trees had low xylem sap tensions, as estimated by a pressure chamber. After a very dry winter, pre-dawn minimum tensions were less than 6 atm, suggesting that these trees were rooted to a water table. Widely spaced Q. lobata trees in upland savannas also had low pre-dawn tensions, presumably due to the lack of woody plant competition. In contrast, all stands of Q. douglasii had high pre-dawn tensions wven after a very wet winter. They seem well adapted to dry slopes where the water table is usually unavailable. Q. douglasii trees appear to drop their leaves when the water supply becomes critical. Trees in some north aspect stands had higher tensions in mid-Aug. than trees in south aspect stands due to soil moisture supply and tree density interactions. During the dry season a size-class effect appeared with tension inversely correlated with crown size and probably root depth.--Copyright 1973, Biological Abstracts, Inc.
W74-13035

WATER STRESS IN KRUMMHOLZ, WASATCH MOUNTAINS, UTAH,
Utah Univ., Salt Lake City. Dept. of Biology.
D. H. Hansen, and L. G. Klikoff.
Bot Gaz. Vol 133, No 4, p 392-394, 1972.

Descriptors: *Stress, *Trees, Coniferous trees, Utah.
Identifiers: Krummholz, Picea-engelmannii, Potential, Wasatch mountains(Utah).

The krummholz form of Engelmann spruce (Picea engelmannii) was found to develop water potentials below -90 bars during the winter. Changes in sugar concentration associated with cold hardiness could not account for such low water potentials. These low water potentials may reflect a frozen substrate and windy conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-13036

PRODUCTIVITY AND NUTRIENT TURNOVER IN MIRE ECOSYSTEMS: I. COMPARISON OF TWO METHODS OF ESTIMATING THE BIOMASS AND NUTRIENT CONTENT OF CLADIUM MARISCUS (L.) POHL,
Nottingham Univ. (England). Dept. of Botany.
J. O. Rieley, and M. Jasnowski.
Oecol Plant. Vol 7, No 4, p 403-408, 1972.

Descriptors: *Bogs, *Marshes, Swamps, Crop production, *Nutrients, Biomass, Calcium, Potassium, Sodium, Productivity, Ecosystems, Magnesium.
Identifiers: *Cladium mariscus, Mire.

The annual production of C. mariscus estimated from end of growing season standing crop using (a) clear cropping and (b) single plant methods is 22.7 and 22.4 t.ha-1, respectively. Chemical analysis of plant parts shows the magnitude of 4 elements in Cladietum marisci to be of the order Ca > K > Mg = Na.--Copyright 1973, Biological Abstracts, Inc.
W74-13037

THE SIGNIFICANCE OF SUMP-PONDS IN HARVESTING PADDY-FIELD FISHES IN NORTH KRIAN, PERAK.
Universiti Sains Malaysia, Penang. Pusat Pengajian Sains Kajihayat.
For primary bibliographic entry see Field 8I.
W74-13039

THE EFFECT OF SUPPLEMENTARY ALGAL FEEDING OF A HATCHERY BREEDING STOCK OF OSTREA EDULIS L. ON LARVAL VIGOUR.
Ministry of Agriculture, Fisheries and Food, Conway (Wales). Fisheries Experiment Station.
For primary bibliographic entry see Field 8I.
W74-13042

JOJOBA: A WAX-PRODUCING SHRUB OF THE SONORAN DESERT, LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY,
Arizona Univ., Tucson. Office of Arid Lands Studies.
W. C. Sherbrooke, and E. F. Haase.
Arid Lands Resource Information Paper No 5, 1974. 141 p. 2 maps, 256 ref. HEW-OS-74-20.

Descriptors: *Planting management, *Bibliographies, *Desert plants, *Systematics, Shrubs, *Southwest U.S., *Mexico, Reviews, Indian reservations.
Identifiers: *Jojoba, *Liquid wax, Plant substances, Seed production, Waxes.

This paper reviews the literature by displaying a computerized annotated bibliography on the desert shrub jojoba (Simmondsia chinensis) of the southwestern U.S. and northwestern Mexico. The shrub's biology and natural history are covered by discussions of its morphology, reproduction, habitat, genetics, systematics, evolution, Ethnobotany, and uses. Utilization of the plant's wax as a whale oil substitute, sulfurization, hydrogenation, acids, alcohols and esters, modern medicinal uses, patents, extraction, and use of meal are described. Native and cultivated plantations, and plantation management are discussed. Current research activities in areas where the plant is both native and introduced are described. Special account is taken of the native American Indian industry based on the uses of the shrub that is developing in south-central Arizona on the San Carlos Indian Reservation; is hoped economic self development can be generated for this and other tribes in those regions where the plant is either found in its native state or where conditions are suitable for its cultivation. (Paylore-Arizona)
W74-13141

EFFECT OF DIFFERENT IRRIGATI METHODS ON THE ALFALFA CROPS IN RI CROP ROTATIONS, (IN RUSSIAN),
N. S. Goryunov, and V. G. Bykov.
Dokl Vses Ord Lenina Adad S-KH Nauk Im Lenina. 10, p 41-42, 1972, Illus.
Identifiers: Alfalfa, Rice, *Irrigation effects.

Various methods of irrigation are discussed w respect to their effect on the alfalfa crops. Un the specific conditions of South Kazakhst USSR, the basin method of irrigation is not reco mended in view of the considerable damage to falfa plants.--Copyright 1973, Biological A stracts, Inc.
W74-13172

QUANTITATIVE AND HISTORIC EVIDENCE OF VEGETATION CHANG ALONG THE UPPER GILA RIVER, ARIZONA
Geological Survey, Tucson, Ariz.
For primary bibliographic entry see Field 3B.
W74-13174

PRIMARY PRODUCTIVITY OF CROP FIELI (IN POLISH),
Polish Academy of Sciences, Koscian. Inst. Ecology.
C. Kukielska.
Bull Acad Pol Sci Ser Sci Biol. Vol 21, No 2, p 1 115, 1973, Illus.
Identifiers: *Potatoes, Rainfall, *Rye.

The primary productivity of rye and potato fie differently fertilized and cultivated for seve seasons under different temperature and rain conditions indicated that the total primary prod tion of crops studied in Wielkopolska (Poland) proximates 1 kg dry weight/ sq m exceeding t value only in the years of facorable moisture c ditions at the critical period for crop developme The crop biomass effects the weed biomass; m luxuriant growth of crops inhibits the growth weeds. The moisture conditions affect throug crop plant the structure and value of the total p mary productivity of both rye and potato field Copyright 1973, Biological Abstracts, Inc.
W74-13270

PLANTS AS INDICATORS OF HYDROLO AND LITHOLOGY IN THE ILI ANCIE DELTA AREA, (IN RUSSIAN),
For primary bibliographic entry see Field 2G.
W74-13283

THE OAK FOREST MIXED WITH BISTORT THE ARDENNES (POLYGONO BISTORTA QUERCETUM ROBORIS), (IN FRENCH),
N. Sougnez.
Bull Jard Bot Natl Belg. Vol 43, No 1/2, p 37- 1973. Illus.

Descriptors: *Oak trees, Forests, Successi Alder trees, Ash trees.
Identifiers: Ardennes, *Belgium.

The bistort-oak forests of the Belgian Arden form mixed populations, generally treated as derbrush in timber. Half of the association tab are derived from populations so treated. Sim copses are less frequent (30%) of the charted s cies, while simple timber comprises only 20% the collections. Generally one finds in the arbor stratum a clear predominance of the peduncul oak (Quercus robur), except for the more fertile luvial areas where it shares the area with sycamore maple and the ash (Fraxinus) tree. Al (Alnus) trees seem to be little influenced by fertility of the soil but depend more on the de of the water table and the frequency of floods. major chapter is devoted to the floristic organi tion, followed by a table of associations compr ing 66 units under 3 main subassociations. T subdivisions of the association are then discuss

letail, with areas of distribution, geologic for-
ions, role of altitude, and soil characteristics.--
pyright 1974, Biological Abstracts, Inc.
4-13301

LYPHENOLS OF COTTON LEAVES AND
E EFFECT ON THEIR COMPOSITION OF
TER AND NUTRITIONAL STRESS (IN
ENCH),
ice de la Recherche Scientifique et Technique
re-Mer, Abidjan (Ivory Coast). Centre
diopodoume.
primary bibliographic entry see Field 3F.
4-13344

IDELINES FOR RESEARCH ON WATER
QUIREMENTS OF CROPS,
itute for Applied Research on Natural
ources, Bagdad (Iraq).
primary bibliographic entry see Field 3F.
4-13345

E RESPONSE OF A GLASSHOUSE TO HIGH
LAR RADIATION AND AMBIENT TEM-
RATURE,
nmonwealth Scientific and Industrial Research
anization, Griffith, (Australia). Div. of Irriga-
Research.
Garzoli, and J. Blackwell.
rnal of Agricultural Engineering Research, Vol
No 3, p 205-216, September, 1973. 6 fig, 28 ref.

scriptors: *Australia, *Greenhouses, *Plant
wth, *Solar radiation, Energy transfer, Esti-
ing equations, Semiarid climates, Tempera-
, Air environment, Soil-water-plant relation-
s, Soil environment, Structural engineering,
nperature control, Ventilation.
ntifiers: *Glasshouses.

semi-arid area of Australia, at inland Griffith,
ries of experiments was conducted to study the
onse of a glasshouse climate to high solar
iation and ambient temperatures. Theoretical
culations were used to describe the energy
sfer processes that took place within the sin-
span glasshouse and between the glasshouse
the outside climate. Using instruments readily
ilable, experimental results demonstrated that
s possible to plot the energy balance of a
sshouse with reasonable surety - designed here
achieve about 5% overall accuracy. The mea-
ements showed most of the heat generated
hin the glasshouse under conditions of such
r radiation and ambient temperature was used
ncrease the total heat (heat content) of the air.
y large ventilation areas were necessary to as-
e reasonable glasshouse temperatures. Inside
glasshouse the amount of heat from solar
iation conducted into the soil was measured to
about 8%. Thus, proper design of glasshouses
plant culture necessitates a thorough un-
standing if the glasshouse response in a prevail-
climate in order to assure good plant growth
production. (Gloyd-Arizona)
4-13347

FECT OF DROUGHT ON THE NUCLEIC
ID CONTENT IN WINTER WHEAT, (IN
RAINIAN),
ademiya Nauk URSR, Kiev. Institut Fiziologii
tenii i Agrokhimii.
. Slukhai, and K. S. Tkachuk.
pov Akad Nauk Ukr Rsr Ser B Heol Heofiz
im Biol, Vol 34, No 12, p 1124-1127, 1972. En-
h summary.
ntifiers: DNA, *Drought, Nucleic acids, RNA,
eat.

e decrease in nucleic acid content was observed
nediately after drought started. Under condi-
ns of soil moisture deficiency (35-40% of total
isture-holding capacity) the RNA and DNA
tents in wheat leaves increase; this is probably
a result of plant adaptation to the unfavorable humidity conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-13352

FOOD AND FEEDING HABITS OF MAHASEER, TOR TOR (HAMILTON),
Punjab Agricultural Univ., Ludhiana (India). Dept. of Zoology Entomology.
P. Sehgal.
Res Bull Panjab Univ Sci, Vol 22, No 1/2, p 253, 1971.
Identifiers: Algae, Diatoms, *Mahaseer, Mollusks, *Fish diets, Sport fish.

Mahaseers are important as sport and table fish. The food and feeding habits of this important fish were studied. Crustaceans formed the dominant item of diet, followed by algae, diatoms and mollusks.--Copyright 1973, Biological Abstracts, Inc.
W74-13369

FISH NUTRITION.
Academic Press: New York, N.Y., London, England, 1972, 713 p, Illus, J.E. Halver, editor. Pr $32.50.
Identifiers: *Fish nutrition, Publications.

The latest information is presented on the basic nutritional requirements of fish reared in tanks, streams and ponds. The types of food used to rear fish are discussed, and all that is now known-and that remains to be known-to develop productive fish husbandry throughout the world. It discusses qualitative and quantitative requirements for essential and non-essential amino acids, crystalline vitamins, essential fatty acids, carbohydrate sources and general nutrient balance. Also discussed is the availability and utilization of dietary ingredients and methods for calculating chemical and nutritional contents of diets, and the role of nutrition in fish diseases discussed from the clinical as well as the histological viewpoint. Other topics covered included specific effects of adventitious toxins in the food supply, and diets and techniques used throughout the world to rear different species of fish. An extensive list of references is included at the end of each chapter which will enable readers to keep up to date on current activities in basic and applied fish nutrition research. The book will be of interest to students and teachers in the field of nutrition, natural resources, conservation and toxicology, as well as researchers in these fields.--Copyright 1973, Biological Abstracts, Inc.
W74-13375

PROLONGED AFTERGLOW OF STRAWBERRY LEAVES AT VARIOUS LEVELS OF HYDRATION, (IN RUSSIAN),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
T. V. Veselova, V. A. Veselovskii, V. V. Grinenko, V. S. Marenkov, and Yu. S. Pospelova.
Fiziol Rast, Vol 20, No 2, p 229-232, 1973. Illus. English summary.
Identifiers: Fragaria, Leaves, *Strawberry, *Dehydration.

The effect of soil drought and direct dehydration of the leaves was studied in 2 strawberry cultivars, 'Chernobrivka' and 'Mize', (Fragaria grandiflora) with different tolerance to water deficiency. Prolonged afterglow was found to undergo 2-phase changes in the course of dehydration. These changes of afterglow were more pronounced and occurred at less dehydration in the case of soil drought. Afterglow in the plants during dehydration differed among the cultivars.--Copyright 1973, Biological Abstracts, Inc.
W74-13378

ELABORATION OF OPTIMAL DOSES AND FORMS OF MACRO- AND MICROELEMENTS AND HUMATES IN THE NUTRIENT USED IN HYDROPONIC CULTURE'WROCLAW,'
Wroclaw Univ. (Poland). Inst. of Botany and Biochemistry.
For primary bibliographic entry see Field 3F.
W74-13380

THE WATER REGIME OF FLOWERS, (IN RUSSIAN),
Ryazanskii Gosudarstvennyi Pedagogicheskii Institut (USSR).
For primary bibliographic entry see Field 2D.
W74-13381

THE EFFECT OF WATER-SALT REGIME OF SOIL ON THE GROWTH OF QUERCUS ROBUR, (IN BYCLORUSSIAN),
For primary bibliographic entry see Field 3C.
W74-13393

INFLUENCE OF THE PARTIAL PRESSURE OF OXYGEN UPON THE RATE OF STOMATAL OPENING AND CLOSING VELOCITY OF PELARGONIUM X HORTORUM IN DARKNESS (IN FRENCH),
Paris-6 Univ. (France). Laboratoire de Physiologie Vegetale Appliquee.
P. Louguet.
Physiol Veg. Vol 10, No 3, p 515-528. 1972. Illus. (English summary).
Identifiers: *Oxygen, *Pelargonium, Pressure, *Stomata.

The effect of O2 deprivation is a complete inhibition of opening and closing movements, which are normally induced in the presence of O2 by variations of the content of CO2 in darkness. A release of this inhibition is obtained as soon as O2 is provided, even under a slight partial pressure (0.005-0.01%). However, the influence of partial pressures O2 between this threshold and 0.2-0.3% is not identical with regard both to the speed of opening and closing, indicating that the mechanisms of opening and closing are different.--Copyright 1973, Biological Abstracts, Inc.
W74-13404

GROWTH OF CROP ROOTS IN RELATION TO SOIL MOISTURE EXTRACTION,
Brooms' Barn Experiment Station, Bury St. Edmonds, (England).
For primary bibliographic entry see Field 3F.
W74-13414

FUNGI IN THE DIET OF GAMMARUS PSEUDOLIMNAEUS (AMPHIPODA),
Waterloo Univ. (Ontario). Dept. of Biology.
F. Barlocher, and B. Kendrick.
Oikos. Vol 24, No 2, p 295-300. 1973.

Descriptors: *Fungi, Invertebrates, Leaves.
Identifiers: *Gammarus pseudolimnaeus.

Autumn-shed leaves which support a rich fungal population are an important source of food for many stream invertebrates. Two experiments were conducted to elucidate the relative importance of fungi and leaf substance in the nourishment of Gammarus pseudolimnaeus. Mycelium of Tricladium angulatum proved to be a much better source of food for adult Gammarus than maple leaves with rich microbial growth. The weight increases of young Gammarus were compared when they could feel exclusively either on maple or elm leaves or on mycelia of 1 of 10 fungi isolated from leaves in streams. The daily consumption of dry substance was about 10 times higher in leaf diets than in fungal diets, but the largest weight increase were found in animals feeding on 4 of the fungi. Two of the fungi were clearly unsuitable as the sole source of food. Elm and maple leaves and the other 4 fungi fell between these extremes.--Copyright 1974, Biological Abstracts, Inc.
W74-13484

COMPARISON OF RATES OF FEEDING AND BIODEPOSITION OF THE AMERICAN OYSTER, CRASSOSTREA VIRGINICA GMELIN, FED DIFFERENT SPECIES OF PHYTOPLANKTON,
Woods Hole Oceanographic Institution, Mass.
K. R. Tenore, and W. M. Dunstan.
J Exp Mar Biol Ecol. Vol 12, No 1, p 19-26. 1973.

Descriptors: *Oysters, *Fish food organisms, *Phytoplankton, *Fish diets.
Identifiers: *American oyster, Crassostrea virginica.

The feeding and biodeposition rates of small (2.4 cm) and large (5.2 cm) Crassostrea virginica were differently affected in experiments using flowing systems by moderate (292 microgram C/l sea water) and high (487 microgram C/l sea water) concentrations of the following phytoplankton: the diatoms Thalassiosira pseudonana (Cyclotella nana), Skeletonoma costatum, Nitzschia closterium, and the green alga, Dunaliella tertiolecta. The average feeding rate of the oysters on the different phytoplankton was: Dunaliella < Nitzschia < Skeletonema < Thalassiosira. In contrast, oysters fed on Thalassiosira had the lowest rate of biodeposition (1.626 X 10 to the third power g ash-free dry weight/g dry flesh weight per day) but oysters cultured on Nitzschia showed the highest rate of biodesposition (2.952 X 10 to the minus 2 power units). The response of the feeding rate of the 2 sizes of oysters to food concentration differed according to the algal food source. Oysters fed on; Thalassiosira and Skeletonema exhibited a higher feeding rate at a higher food level; in contrast, oysters fed on Nitzschia showed no significant differences and those cultured on Dunaliella a depressed feeding rate at the higher food concentration. No differences were observed in feeding rate between small and large osyters fed on Skeletonema and Dunaliella, but small oysters had a higher feeding rate than large oysters when cultured on Thalassiosira and a lower feeding rate when fed on Nitzschia. The smaller size of Thalassiosira and larger size of Nitzschia might account for these differences in the feeding efficiency of small oysgers. The biodeposition rates of both sizes of oysters were also affected by food concentration of the different algae. At the high food concentration with Skeletonema, Nitzschia, and Dunaliella, all oysters showed a marked increase in the rate of biodeposition, but oysters fed on Thalassiosira exhibited no great change. On all species of phytoplankton, the larger oysters produced greater biodeposition than the small oysters.--Copyright 1974, Biological Abastract, Inc.
W74-13490

PLANT POPULATION AND HUMIDITY RELATIONSHIPS IN GRASSLAND: THE QUESTION OF EVALUATING POPULATION SAMPLES, (IN GERMAN),
F. Wacker.
Z Acker- Pflanzenbau, Vol 137, No 2, p 131-143, 1973. English summary.

Descriptors: *Plant populations, *Grasslands, Humidity.

The advantages and disadvantages of the methods of Ellenberg, Klapp and Wittmann for assessing the residual moisture of the habitat of grassland populations from a given plant population are discussed. An attempt is made to show some way in which one can arrive at a balanced and detailed judgment of the humidity of the habitat by taking into consideration the indicator value and the dominance (as a proportion of the yield) of all the plants represented in the population and the mean humidity value. Attention is drawn to the necessity of verifying the humidity values and of comparative investigations between the plant population and the humidity of the habitat.--Copyright 1974, Biological Abstracts, Inc.
W74-13491

EFFECTS OF LOW SOIL TEMPERATURE ON TRANSPIRATION, PHOTOSYNTHESIS, LEAF RELATIVE WATER CONTENT, AND GROWTH AMONG ELEVATIONALLY DIVERSE PLANT POPULATIONS,
For primary bibliographic entry see Field 2D.
W74-13492

FOOD HABITS OF THE MOUNTAIN WHITEFISH, PROSOPIUM WILLIAMSONI (GIRARD),
Wyoming Univ., Laramie. Dept. of Zoology and Physiology.
R. W. Pontius, and M. Parker.
Trans Am Fish Soc. Vol 102, N)<, No 4, p 764-773, 1973. Illus.

Descriptors: *Fish behavior, *Fish food organisms, *Wyoming, Fish diets.
Identifiers: Prosopium williamsoni, *Whitefish, *Snake River(Wyo).

Organisms eaten by mountain whitefish in the Snake River, Wyoming, were analyzed. Abundance of an organism in a whitefish stomach is dependent upon the organism's availability. The stomach contents in all size classes differed in taxonomic composition. Overlap in the taxonomic categories of food organisms eaten by fish of size classes II and III was about 50%. Larger fish were more generalized feeders and could utilize a greater size range of prey organisms than smaller fish. This was reflected in the increase of food length diversity (FLD) and food taxa diversity (FTD) with increasing fish size. FTD was correlated most closely with the taxonomic richness of stomach contents rather than relative abundance of items in each taxonomic category. Counting the taxa in stomachs gave some measure of FTD. Choices concerning the type of food eaten (species richness component of diversity) are most important in affecting FTD. Comparison of stomach contents with drift and bottom samples showed that fish could not have fed randomly solely from the drift or bottom. Morphology of the whitefish and the occurrence of sand and gravel in stomachs are in indication of bottom feeding.--Copyright 1974, Biological Abstracts, Inc.
W74-13497

2J. Erosion and Sedimentation

THE FIELD STUDY OF SAND MOTION THROUGH POROUS MEDIUM BY MEANS OF LUMINOPHORS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
Yu. A. Ibad-Zade, and B. S. Shteinman.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol 1, p 118-123, 1972. 3 fig, 2 ref.

Descriptors: *Bed load, *Porous media, *Alluvial channels, Sands, Sediment transport, Alluvium, Tracers, Fluorescent dye, Tracking techniques, Boreholes.
Identifiers: *USSR(Terek River).

Sand motion under the channels of the Caucasian rivers was studied using dyed sand grains. Boreholes penetrating into the soil under the channel were used. To catch the travelling sand in different zones of soil, special tube traps divided into horizontal cells were placed inside the boreholes. Although the velocities of sand motion under the bed are small, total volume may be appreciable due to the considerable depth of the travelling sand: for example, in one of the experiments on the river Terek about 170 tons/day of sand were displaced through the section. (See also W74-12811) (Knapp-USGS)
W74-12817

COUPLING BETWEEN TRANSPO PROCESSES IN AN ANISOTROPIC MIXTU OF FLUIDS AND SOLID PARTICLES,
Commonwealth Scientific and Industrial Resea Organization, Canberra (Australia).
P. H. Groenevelt, and G. H. Bolt.
In: Proc of 2nd International Symposium on F damentals of Transport Phenomena in Por Media, August 7-11, 1972, Guelph Univ, Onta International Association for Hydraulic Resea and International Society of Soil Science J Pub, Vol II, p 653-666, 1972. 11 ref.

Descriptors: *Flow, *Suspension, *Cl *Slurries, Suspended load, Membrane proces Sediment transport, Soil water movement, saturated flow, Groundwater movement.

In a mixture of solid particles and fluids, for stance a clay-water-air mixture, the load stress some of the 'peculiar' stresses may have to described by second order tensors. The pecu stresses provide the tools for a continu mechanical treatment of the dynamics of system. This treatment is compared with a t modynamic treatment for which the usefulnes the concept of chemical potential tensors discussed. Constitutive equations are proposed flow processes of and within a clay-salt-wate mixture. These equations describe the effect coupling between the transport processes i macroscopically anisotropic mixture of fluids solid particles. (See also W74-12811) (Kna USGS)
W74-12849

OCCURRENCE AND DISTRIBUTION OF CL MINERALS AND TRACE METALS IN T BOTTOM SEDIMENT OF BILOXI BAY, M SISSIPPI,
Mississippi Univ., University. Dept. of Geol and Geological Engineering.
For primary bibliographic entry see Field 2L.
W74-12860

COMPONENT DESCRIPTION OF SEDIME WATER MICROCOSMS,
Utah State Univ., Logan. Center for W Resources Research.
For primary bibliographic entry see Field 5C.
W74-12868

TOXIC METALS IN LAKE AND RIVER SE MENTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12909

THE RECENT SEDIMENTS OF WINDERME
Leicester Univ. (England). Botany Lab.
W. Pennington.
Freshwater Biol. Vol 3, No 4, p 363-382. 1 Illus.

Descriptors: *Sediments, *Analysis, M Analytical techniques, Lakes, *Sedimenta rates, Movement.
Identifiers: *United Kingdom(Windermere).

Recent analyses of the topmost 30 cm of sedim in Windermere (United Kingdom) are presen These confirm and expand earlier work on the ture and interpretation of the change in sedim type now found 27 cm below the mud surface. results of 4 different methods of estimation of present rate of sediment accumulation are c pared and agree on a figure between 2 an mm/yr. Explanations which involve environme changes either on the catchment or in the lake put forward to account for the difference betw this figure and the mean postglacial rate of 0.3 mm/yr.--Copyright 1974, Biological Abstra Inc.
W74-12931

EDICTING SEDIMENT YIELD FROM CLI-
ATE AND TOPOGRAPHY,
ricultural Univ., Wageningen (Netherlands).
M. L. Jansen, and R. B. Painter.
rnal of Hydrology, Vol 21, No 4, p 371-380,
4. 2 fig, 4 tab, 15 ref.

scriptors: *Sedimentation rates, *Sediment
ld, *Regression analysis, Optimization, Cli-
tic zones, Topography, Soil conservation,
tersheds(Basins), Erosion, Mathematical
dels, Mathematical studies, Statistical
thods, Rivers, Yield equations.
ntifiers: Worldwide, Global denudation, Linear
ression models.

ear regression models relating annual average
iment yield with a number of climatic and topo-
phic variables were developed for rivers (basin
a greater than 5000 sq km) in each of the
rld's major climatic zones. The models were of
ue as a predictive tool to assess the scale of the
iment problem in rivers where no sediment
a exist. Despite the limitations imposed by the
of numerical optimisation in their develop-
nt, the relative significance of different climatic
l topographic factors was demonstrated, and an
imate of the annual global denudation, based on
equations, compared satisfactorily with exist-
figures. (Terstriep-ISWS)
4-13002

THYLMERCURY: BACTERIAL DEGRADA-
ON IN LAKE SEDIMENTS.
dwest Research Inst., Kansas City, Mo.
r primary bibliographic entry see Field 5B.
4-13038

E MERCURY CONTENT OF SEDIMENTS
OM TWO LAKES IN DALARNA, SWEDEN,
psala Univ. (Sweden). Dept. of Quaternary
ology.
Fredriksson, and U. Qvarfort.
ol Foren Stockh Forh. 95(2): 237-242, Illus,
3.

scriptors: Europe, *Sediments, Mercury,
kes, Lake sediments.
ntifiers: Dalarna, Picea, Pike, Sweden.

ta are given on the Hg content of sediment sam-
s from 2 lakes situated in an area not influenced
industrial pollution. In one of the lakes, pike
re found with a high Hg content. To date the
iments, the increase of the frequency of the
ea pollen is used. The Hg content of the sedi-
nts is quite constant and has in part been fairly
h for at least the last 3000 yr.--Copyright 1974,
ological Abstracts, Inc.
4-13040

IT STREAM POWER FOR SEDIMENT
ANSPORT IN NATURAL WATERS.
nois State Water Survey, Urbana.
T. Yang, and J. B. Stall.
ailable from the National Technical Informa-
n Service, Springfield, Va 22161 as PB-236 415
75 in paper copy, $2.25 in microfiche. Illinois
ter Resources Center, Urbana, Research Re-
rt No 88, July 1974. 38 p, 32 ref, 27 tab. OWRT
075-ILL(1), 14-31-0001-3881.

scriptors: Rivers, *Sediment transport,
draulics, Open channel flow, Energy equation,
uations, Movement, Alluvial channels, Flumes,
id mechanics, Boundary layers.
ntifiers: Incipient motion, *Unit stream power.

e relationship between rate of sediment trans-
rt and rate of potential energy expenditure has
en studied. Unit stream power, defined as the
e rate of potential energy expenditure per unit
ight of water, is shown to be the dominant fac-
in the determination of total sediment concen-
tion. Basic concepts in fluid mechanics and boundary layer theory are used to establish the flow condition in incipient motion. Two equations that provide simple and direct criteria for incipient motion are found. These equations are verified by 153 sets of data independently collected by eight investigators. A dimensionless unit stream power equation is found for the prediction of total sediment concentration for both laboratory flumes and natural rivers. This equation not only provides a good estimation of the total sediment concentration in an alluvial channel but also correctly reflects the effects of the variations of particle size, water depth, and water temperature on total sediment concentration. Data collected from six natural rivers and more than one thousand sets of laboratory data are used in supporting this equation. Data collected from 17 regular gaging stations on natural rivers also indicate that unit stream power dominates the rate of sediment transport.
W74-13049

DEPOSITION OF RIVER SILTS IN THE RHINE AND MEUSE DELTA,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5B.
W74-13155

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES,
National Oceanic and Atmospheric Administration, Rockville, Md.
For primary bibliographic entry see Field 2H.
W74-13178

HYDROGEOLOGIC ASPECTS OF STRUCTURAL DEFORMATION IN THE NORTHERN GULF OF MEXICO BASIN,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 2F.
W74-13179

AERIAL OBSERVATIONS OF SUSPENDED-SEDIMENT PLUMES IN SAN FRANCISCO BAY AND THE ADJACENT PACIFIC OCEAN,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W74-13180

CHERT DERIVED FROM MAGADIITE IN A LACUSTRINE DEPOSIT NEAR ROME, MALHEUR COUNTY, OREGON,
Geological Survey, Denver, Colo.
R. A. Sheppard, and A. J. Gude, III.
Journal of Research, US Geological Survey, Vol 2, No 5, p 625-630, September-October, 1974. 7 fig, 12 ref.

Descriptors: *Chert, *Bottom sediments, *Diagenesis, *Mineralogy, Sedimentary rocks, Silica, Silicates, Chemical precipitation, *Oregon.
Identifiers: *Magadiite, Rome(Ore).

Nodules and thin beds of chert occur in the upper part of the informally named Rome beds, about 8-11 km southwest of Rome, Oregon. The chert is in green to gray mudstone, about 8 m beneath a conspicuous gray and yellow zeolite tuff. The bedded chert contains molds of saline minerals, and it grades southward and marginward into nodular chert. The nodular chert is of two varieties: relatively large lobate nodules that have greenish-brown interiors and abundant saline crystal molds, and relatively small lobate nodules that have gray interiors and a surface reticulation. The latter variety is the so-called snakeskin agate prized by lapidaries. Both nodular varieties characteristically have a thin white rind. The cherts are similar, if not identical, to cherts reported from Quaternary lacustrine deposits in eastern Africa and from Pleistocene to Jurassic lacustrine deposits in Wyoming. The Rome chert probably formed from a hydrous sodium silicate precursor such as magadiite during diagenesis. Magadiite is generally a primary precipitate from a highly alkaline lake which is capable of attaining a high concentration of silica in solution. (Knapp-USGS)
W74-13184

CHANGES IN SEDIMENT LOADS IN RIVERS OF THE ATLANTIC DRAINAGE OF THE UNITED STATES SINCE 1900,
Geological Survey, Woods Hole, Mass.
For primary bibliographic entry see Field 5B.
W74-13215

SEDIMENTATIONAL REGIMES OF THE YORK RIVER, SOUTHEASTERN VIRGINIA, AS SHOWN BY MASS PROPERTIES,
Lafayette Coll., Easton, Pa. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W74-13473

2K. Chemical Processes

CALCIUM CARBONATE EQUILIBRIA IN SOILS AND IN IRRIGATION WATERS,
New Mexico State Univ., Las Cruces. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-12862

DEPOLARIZED RAYLEIGH SCATTERING AND HYDROGEN BONDING IN LIQUID WATER,
Catholic Univ. of America, Washington, D.C.
For primary bibliographic entry see Field 1A.
W74-12922

STUDY OF THE STRUCTURE OF MOLECULAR COMPLEXES. VI. DIMERS AND SMALL CLUSTERS OF WATER MOLECULES IN THE HARTREE-FOCK APPROXIMATION,
IBM Research Lab., San Jose, Calif.
For primary bibliographic entry see Field 1A.
W74-12923

THE CHEMICAL COMPOSITION AND FLOW OF THE RIVER FROME AND ITS MAIN TRIBUTARIES,
Freshwater Biological Association, Wareham (England). River Lab.
H. Casey, and P. V. R. Newton.
Freshwater Biol. Vol 3, No 4, p 317-333. 1973. Illus.

Descriptors: *Rivers, *Chemical analysis, Alkalinity, Calcium, Magnesium, Sodium, Potassium, Phosphates, Nitrates, Biota, Snowmelt.
Identifiers: *United Kingdom(Frome River).

Weekly measurements of chemical composition were made at 16 sampling points on the River Frome (United Kingdom) and its main tributaries from Oct. 1970 - Dec. 1971. At 14 of these points stream discharge was measured. Water samples from each sampling point were analyzed for alkalinity, Ca, Mg, Na, K, pH, conductivity, reactive phosphate and nitrate. Mg varied little in concentration; alkalinity and Ca concentrations decreased in time of flood. The highest concentration of Na occurred after snow had melted from salted roads; otherwise it showed little variation. The highest values for nitrate N were at peak flows but otherwise it altered little. P and K varied most and both showed a reduction between Feb. and May. These results are part of a survey of the chemical composition of the waters of rivers in the south of England. This survey is aimed at providing a picture of the chemical environment of the rivers as a background for ecological work on the biota and to investigate the factors influencing variations in chemical composition. A preliminary paper described the flow and chemistry at 1 point

(East Stoke) on the lower part of the river. The contribution each main source makes to the flow and chemistry of the whole river is reported herein.--Copyright 1974, Biological Abstracts, Inc.
W74-12928

DETERMINATION OF ORGANIC ACIDS OF LOW RELATIVE MOLECULAR MASS (C-1 TO C-4) IN DILUTE AQUEOUS SOLUTION,
Swedish Forest Products Research Lab., Stockholm.
For primary bibliographic entry see Field 5A.
W74-12929

HYDROCARBON COMPONENTS TO FLOATING OIL POLLUTANTS OF SEA WATER, (IN JAPANESE),
Shimadzu Seisakusho Ltd., Tokyo (Japan). Tokyo Research Lab.
For primary bibliographic entry see Field 5A.
W74-13075

A DIRECT ESTIMATION OF MICROGRAM AMOUNTS OF AMMONIA IN WATER WITHOUT SALT-ERROR,
Tokyo Univ. (Japan). Fisheries Inst.
For primary bibliographic entry see Field 5A.
W74-13084

AN INVESTIGATION OF THE MINERALOGY AND PETROGRAPHY OF URANIUM-BEARING SHALES,
Pennsylvania State Univ., University Park. Dept. of Mineralogy and Petrography.
T. F. Bates.
Available from NTIS, Springfield, Va 22161 as NYO-9605, $4.25/copy, $2.25/microfiche. Report No NYO-9605, August 1961. 58 p, 1 fig, 4 tab, 20 ref, 3 append.

Descriptors: *Research and development, *Mineralogy, *Petrography, Geology, *Uranium, *Shales, Chemical analysis, Data collections, Geographical regions, Trace elements, Rocks.

Ten years of research work is summarized on the mineralogy and petrology of certain black shales of particular interest because of significant concentrations of uranium. The main objectives of the investigation were: (1) to obtain a large amount of precise mineralogical, petrographic and chemical data on many samples of black shale representative of various geologic periods, geographic localities and degree of uranium concentration; (2) to analyze and define the interrelationship between the numerous measured variables with respect to differences between geologic and geographic units within each shale studied, and differences between shales; and (3) to interpret the results in the light of present concepts with the hope of adding new information in such areas as: the mineralogical and chemical nature of black shales, the relationship of uranium and other trace elements to the major constituents and to the petrographic characteristics of the rocks, the interrelationships of organic and inorganic matter, and the geological conditions which lead to the formation of these rocks and the concentration of uranium in them. (Houser-ORNL)
W74-13116

DETERMINATION OF CHEMICAL OXYGEN DEMAND INDICES IN WATER, (IN RUSSIAN),
For primary bibliographic entry see Field 5A.
W74-13130

QUALITY OF GROUND WATER IN BIKANER DISTRICT OF WESTERN RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 4B.
W74-13151

APPLICATION OF RED-LEAD TO THE DETECTION OF DISSOLVED SULFIDE IN WATERLOGGED SOILS,
Universidade Federal da Bahia, Salvador (Brazil). Inst. of Geosciences.
For primary bibliographic entry see Field 2G.
W74-13161

REGIONAL FLOW SYSTEM AND GROUNDWATER QUALITY IN WESTERN OHIO,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 4B.
W74-13181

CHERT DERIVED FROM MAGADIITE IN A LACUSTRINE DEPOSIT NEAR ROME, MALHEUR COUNTY, OREGON,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 2J.
W74-13184

EFFECTS OF RAINFALL AND DIFFERENTIAL APPLICATION OF N, P, K AND CA ON THE DOWNWARD MOVEMENT OF K IN AN AVALON MEDIUM SANDY LOAM CROPPED WITH MAIZE (ZEA MAYS L.),
Agricultural Research Inst., Cedara (South Africa).
For primary bibliographic entry see Field 2G.
W74-13251

TEMPERATURE-CONTROLLED FLUID MANIFOLD FOR A FLUID SYSTEM OF AN AUTOMATED SAMPLE ANALYZER,
Technicon Instruments Corp., Tarrytown, N.Y. (assignee)
For primary bibliographic entry see Field 7B.
W74-13258

DETECTION OF DILUTE ORGANIC ACIDS IN WATER BY INELASTIC TUNNELING SPECTROSCOPY,
Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
For primary bibliographic entry see Field 5A.
W74-13304

DATA ON THE HYDROBIOLOGICAL STATUS OF THE BODROG RIVER BACKWATER AT SAROSPATAK: II. HYDROCHEMISTRY,
Wasser-Kanalis. Kamitats Hajdu-Bihar, Debrecen (Hungary).
I. Devai, G. Devai, A. Szabo, K. Horvath, and I. Bansci.
Acta Biol Debrecina, 9, p 177-186, 1971.
Identifiers: *Carbon dioxide, *Oxygen, *Water chemistry, *Hungary(Bodrog River).

The dissolved O2, free CO2, P, NO3, as well as K, Na, Mg, Ca, hydrocarbonate, sulfate ions levels and pH values of stagnant waters in the Bodrog river flood plain area (backwaters of Bodrog and other water bodies) at Sarospatak (Hungary) were studied. Like the water of Bodrog river, the waters of the backwards pertain to the beta-limno, Ca-HCO3 type. The different backwaters can be positively classified according to their O2 demands, Fe contents, and 02-CO2 cycles, which is most probably due to the differences in the intensity, nature and relations of synthetic and lytic processes.--Copyright 1973, Biological Abstracts, Inc.
W74-13385

HYDROECOLOGICAL STUDIES OF THE WATER BODIES OF THE BUKK AND ZEMPLEN MOUNTAINS: II,
Lajos Kossuth Univ., Debrecen (Hungary). Zoological Inst.
J. Szabo, G. Devai, K. Horvath, and I. Devai.
Acta Biol Debrecina, 9, p 187-195, 1971.
Identifiers: *Hungary, Organisms, *Spring wate *Carbon dioxide, Montane regions.

The free CO2 content of spring and creek wat of the Bukk and Zemplen Mountains in Northea ern Hungary was studied. The free CO2 content spring water, dependent of the volume of t caves from which such springs collect their wat was high and relatively steady. The free CO2 le in creek water was consequently considerab lower than that of spring water, and was fluenced by such factors as solar irradiation, t abundance of aquatic microorganisms, and t water pH value.--Copyright 1973, Biological A stracts, Inc.
W74-13388

DETERMINATION OF URANIUM IN NATURA WATERS AFTER ANION-EXCHANG SEPARATION,
Vienna Univ. (Austria). Analsches Institut.
For primary bibliographic entry see Field 5A.
W74-13416

STRUCTURE OF LIQUID WATER. STATIST CAL THERMODYNAMIC THEORY,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 1A.
W74-13417

STRUCTURE OF LIQUID WATER. II. IM PROVED STATISTICAL THERMODYNAMI TREATMENT AND IMPLICATIONS OF CLUSTER MODEL,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
For primary bibliographic entry see Field 1A.
W74-13418

RAMAN SPECTRA AND STRUCTURE O WATER FROM -10 TO 90 (DEGREES C),
Regional Research Lab. Agricultural Researc Service, Berkeley, Calif.
For primary bibliographic entry see Field 1A.
W74-13419

INVESTIGATIONS ON THE CATION-CO TENT IN A BOG: I. DIFFERENCES IN TH VEGETATION-COMPLEXES, (IN GERMAN),
Frankfurt Univ. (West Germany). Botanical Inst.
For primary bibliographic entry see Field 2H.
W74-13470

INVESTIGATIONS ON THE CATION-CO TENT IN A BOG: II. SEASONAL CHANGE AND INFLUENCE OF THE SPHAGNU VEGETATION, (IN GERMAN),
Frankfurt Univ., (West Germany). Botanical Inst
For primary bibliographic entry see Field 2H.
W74-13471

2L. Estuaries

POLLUTION MANAGEMENT IN TH COASTAL STATES,
Coastal States Organization, Savannah, Ga.
For primary bibliographic entry see Field 5G.
W74-12767

SOUTH CAROLINA'S NEW MARIN RESOURCES CENTER,
South Carolina Wildlife Resources Dept., Cha leston. Marine Research Lab.
E. B. Joseph.
In: Proceedings of the 24th Annual Session Gu and Caribbean Fisheries Institute, Novembe 1971, Rosenstiel School of Marine and A mospheric Science, University of Miami, Cor Gables, Florida, p 144-147.

escriptors: *Education, *South Carolina, Water sources development, Comprehensive planning, esearch and development, Water Resources Institute, *Research facilities, Organizations.
lentifiers: *Coastal zone management.

he design and mission of South Carolina's New arine Resources Center are highlighted in this report. The Center's purpose is to bring about coornated comprehensive management of the coastal ne in South Carolina, and to enhance the evelopment of its resources in a manner consistent with the long term needs of the people. Acvities of the center will include research, educaon, and advisory services in addition to manageent functions. The center will be located at Fort hnson, Charleston Harbor, on 75 acres of highly sirable land. Included in the center's complex e over 20,000 square feet of laboratory space ith environmentally controlled rooms and a walk freezer and cooler in addition to the more tradinal facilities. Architectural concepts of the nter's design are depicted. The initial investment facilities now under construction at the complex ceed $3 million, not including land costs. The iginal funding comes from the State of South arolina and the Coastal Plains Regional Commison. (Schroeder-Wisconsin)
74-12775

ELATIONSHIP BETWEEN THE HYDROLOY, FLUID CHEMISTRY AND DIAGENETIC INERAL FORMATION IN THE COASTAL REAS OF THE PERSIAN GULF,
ntario Water Resources Commission, Ottawa.
J. Patterson.
: Proc of 2nd International Symposium on Funmentals of Transport Phenomena in Porous edia, August 7-11, 1972, Guelph Univ, Ontario: ternational Association for Hydraulic Research d International Society of Soil Science Joint ab, Vol II, p 683-698, 1972. 6 fig.

escriptors: *Diagenesis, *Coastal plains, Evaporation, Mineralogy, Water table, Groundater movement, Sea water, Gypsum, Brines, olomite, Carbonates, Magnesium.
entifiers: *Persian Gulf, *Sabkhas.

edimentary offlap and a relative fall in sea level ve resulted in the development of broad, gently award sloping, planar areas, or sabkhas, along uch of the south shore of the Persian Gulf. The ater table beneath these areas always slopes award and is never more than 1 to 1-1/2 meters low the surface. When the water-table depth is this range, the sabkha surface has achieved a ate of deflational equilibrium. In the seaward eas, strong onshore winds drive thin sheets of awater several kilometers inland. This seawater concentrated by evaporation and then slowly intrates. Reaction between these brines and the rbonate sediments results in the formation of olomite, magnesite and gypsum. In the landward gion, continentally derived groundwaters move award. Evaporation through the thin sediment ction above the water table causes the precipitaon of gypsum and anhydrite. (See also W74-811) (Knapp-USGS)
74-12851

PPLICATION OF BOUNDARY-LAYER HEORY TO DISPERSION IN WELL-MIXED STUARIES,
ielsen Engineering and Research, Inc., Mountain iew, Calif.
or primary bibliographic entry see Field 5B.
74-12858

CCURRENCE AND DISTRIBUTION OF CLAY INERALS AND TRACE METALS IN THE OTTOM SEDIMENT OF BILOXI BAY, MISSSIPPI,
ississippi Univ., University. Dept. of Geology d Geological Engineering.
. R. Reynolds, and D. A. Thompson.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 291, $3.75 in paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report (1974). 41 p, 7 fig, 2 tab, 47 ref. OWRT A-073-MISS(1).

Descriptors: Estuaries, *Sediment transport, Clays, *Mississippi, Bays, Mineralogy, *Trace elements, *Metals, *Bottom sediments, *Clay minerals, Distribution patterns, Entropy, Mixing.
Identifiers: *Biloxi Bay(Miss), Trace metals.

Sixty-eight percent of the bottom sediment in the Biloxi Bay estuary system is 62 microns and less in size. The clay fraction of this predominant mud sediment type consists of 49% montmorillonite, 40% kaolinite and 11% illite with minor occurrences of vermiculite and sauconite. There is no distinct distribution pattern of any one of the clay mineral types. The two micron fraction of sample material from all stations contained nearly the same ratio of the dominant clay minerals. High entropy values obtained for each sample site indicate a thorough mixing of all the clay species. Mean concentrations of Cd, Pb, Ni and Co in the two micron fraction of bottom sediment are below 50 ppm whereas Cr is 120 ppm, Cu is 138 ppm and Zn is 130 ppm. Iron is concentrated on the average of 4.15 x 10,000 ppm. The values for Cr, Cu, Zn and Fe are greater than the average concentrations reported for soils and nearshore sediments. The bulk of these metals is probably introduced into the Biloxi Bay system from anthropogenic sources. Also, their high concentration is due to ion sorption and probably organic chelation. There is some indication of a possible inland movement of bottom sediment.
W74-12860

STORM SURGES IN THE BAY OF BENGAL,
Meteorological Office, New Delhi (India).
P. K. Das, M. C. Sinha, and V. Balasubramanyam.
Quarterly Journal of the Royal Meteorological Society, Vol 100, p 437-449, 1974. 5 fig, 4 tab, 15 ref.

Descriptors: *Storm surge, *Bays, *Waves(Water), *Tides, *Indian Ocean, Sea level, Shallow water, Coriolis force, Wind pressure, Coasts, Fluid friction, Model studies, Storms.
Identifiers: *Bay of Bengal, *Finite difference method, Bangladesh, Landfill, Tidal currents, Storm center.

Estimates of the surge generated by a model storm impinging on three coastal areas of the northern part of the Bay of Bengal were presented. A linear shallow-water long-wave model was used to evaluate the surge. A hydrostatic pressure distribution was assumed and external forces, such as atmospheric pressure, the Coriolis force, and frictional effects at the surface and the sea bed were included in the model. Surge amplitudes were computed for different values of storm intensity and speed with a finite difference scheme. The effect of the astronomical tide was estimated by specifying initial boundary conditions on the open boundary of the computational grid. For a devastating storm, which struck Bangladesh on November 12/13, 1970, it was shown that superposition of the surge on the tide resulted in overestimation of sea level at the time of landfall. (Bhowmik-ISWS)
W74-12985

THREE-DIMENSIONAL STRUCTURE OF STORM-GENERATED CURRENTS,
Shell Development Co., Houston, Tex.
G. Z. Forristall.
Journal of Geophysical Research, Vol 79, No 18, p 2721-2729, June 20, 1974. 9 fig, 13 ref, append.

Descriptors: *Storm surge, *Gulf of Mexico, *Mathematical models, *Analytical techniques, Hurricanes, Ocean currents, Coasts, Offshore platforms, Finite element analysis, Mathematical studies.
Identifiers: *Wind-generated currents, Three-dimensional flows, Current profiles.

Studies with a mixed numerical and analytical model showed it was possible to model three dimensional time-dependent currents by numerical integration over a two-dimensional grid followed by an evaluation of convolution integrals over the sea slope and wind stress. Using the model, it was observed that a tight circular wind system can spin up the water column to velocities much higher than those generated by a linear wind and that the outward flow at the surface was balanced by an inward flow near the bottom. Solutions for idealized cases were compared with analytical results, and a study of a hurricane in the Gulf of Mexico was presented. (Humphreys-ISWS)
W74-12992

SURFACE SHEAR WAVES,
Bristol Univ. (England). School of Mathematics.
For primary bibliographic entry see Field 8B.
W74-12994

CHEMICAL WATER TYPES AND THEIR DISTRIBUTION IN SPACE AND TIME IN THE AMSTERDAM DUNE-WATER CATCHMENT AREA WITH ARTIFICIAL RECHARGE,
Vrije Universiteit, Amsterdam (Netherlands). Inst. of Earth Sciences.
For primary bibliographic entry see Field 4B.
W74-13004

AN OBSERVATION OF RAPID THERMOCLINE FORMATION IN THE MIDDLE-ATLANTIC BIGHT,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 5B.
W74-13005

STANDING WAVES ON BEACHES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
J. N. Suhayda.
Journal of Geophysical Research, Vol 79, No 21, p 3065-3071, July 20, 1974. 7 fig, 29 ref. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Waves(Water), *Beaches, *Winds, *Shores, *Frequency analysis, Hydraulics, Fluid mechanics, Gravity waves, Sensors, Mexico, Pressure measuring instruments, Standing waves.
Identifiers: *Run-up, Spectra, Staff gages, Reflection coefficient, Edge waves, Bicoherence, Leaky mode, Standing waves, Mexico(El Moreno Beach-Baja-Calif), Density spectrum.

Simultaneous measurements of run-up spectra and nearshore wave spectra associated with standing waves were made on a natural beach at El Moreno, Baja California, Mexico. Digital wave staffs and bottom-mounted pressure sensors were placed in a line at various distances offshore from a digital run-up meter. The run-up meter measured the position of the edge of the water. To avoid the possible influence of nonlinear interactions on the spectra, bicoherence was estimated and the frequency range appropriate to a linearized model was defined. The cross-spectra phase angles between data records had values near zero or pi at frequencies of high coherence. The energy spectrum levels and the observed phase differences between records were in good agreement with the linear shallow water wave theory for standing waves on a plane beach. The general reflection coefficient for the data, estimated from the disagreement between data and standing wave theory, was approximately 0.7. (Bhowmik-ISWS)
W74-13006

MANGROVES AND COASTAL MORPHOLOGY IN CAIRNS BAY, NORTH QUEENSLAND,
Melbourne Univ., Parkville (Australia).
E. C. F. Bird.
J Trop Geogr. 35 p 11-16, 1972. Illus.

Descriptors: *Mangrove swamps, Marshes, Swamps, Forests, Australia, *Coasts, Salt marshes, *Geomorphology, Sedimentation.
Identifiers: Avicennia-marina, Cairns Bay, *North Queensland, Rhizophora, Succession.

Mangrove colonization has led to a reshaping of the upper part of the inter-tidal profile. Avicennia marina has particularly promoted accretion of sediment and it is suggested that mangroves with pneumatophores are more effective in trapping sediment than mangroves with prop-roots, such as Rhizophora. The succession from mangroves to swamp forest is interrupted in slightly drier areas by the development of salt marsh.--Copyright 1973, Biological Abstracts, Inc.
W74-13034

PCB CONTENTS IN MARINE ANIMALS IN TOKYO BAY, (IN JAPANESE),
Tokai Regional Fisheries Research Lab., Tokyo (Japan).
For primary bibliographic entry see Field 5C.
W74-13083

SOME HEAVY METALS IN SPRAT (SPRATTUS SPRATTUS) AND HERRING (CLUPEA HARENGUS) FROM THE INNER OSLOFJORD),
Oslo Univ. (Norway). Lab. for Marine Zoology and Marine Chemistry.
For primary bibliographic entry see Field 5C.
W74-13089

ACUTE TOXICOLOGY TO AN ESTUARINE TELEOST OF MIXTURES OF CADMIUM, COPPER AND ZINC SALTS,
National Marine Water Quality Lab., West Kingston, R.I.
For primary bibliographic entry see Field 5C.
W74-13101

DEPOSITION OF RIVER SILTS IN THE RHINE AND MEUSE DELTA,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5B.
W74-13155

SOLUBILIZATION OF HYDROCARBONS BY THE DISSOLVED ORGANIC MATTER IN SEA WATER,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5D.
W74-13166

AVAILABILITY OF FRESH GROUND WATER IN NORTHEASTERN WORCESTER COUNTY, MARYLAND: WITH SPECIAL EMPHASIS ON THE OCEAN CITY AREA,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 4B.
W74-13175

AN EVALUATION OF THE MAGOTHY AQUIFER IN THE ANNAPOLIS AREA, MARYLAND,
Geological Survey, Parkville, Md.
For primary bibliographic entry see Field 4B.
W74-13176

HYDROGEOLOGIC ASPECTS OF STRUCTURAL DEFORMATION IN THE NORTHERN GULF OF MEXICO BASIN,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 2F.
W74-13179

AERIAL OBSERVATIONS OF SUSPENDED-SEDIMENT PLUMES IN SAN FRANCISCO BAY AND THE ADJACENT PACIFIC OCEAN,
Geological Survey, Menlo Park, Calif.
P. R. Carlson, and D. S. McCulloch.
Journal of Research, US Geological Survey, Vol 2, No 5, p 519-526, September-October, 1974. 14 fig, 7 ref.

Descriptors: *Sediment transport, *Suspended load, *Estuaries, *California, Aerial photography, Sedimentation, Path of pollutants, Turbidity, Salinity.
Identifiers: *San Francisco Bay.

Aerial observations of suspended-sediment patterns in the San Francisco Bay estuary system, together with shipboard water-property measurements, show that a plume of highly turbid, low-salinity waterassociated with the Sacramento-San Joaquin River system bifurcates in the central bay. During a winter storm period when Sacramento-San Joaquin discharge was about 7,800 cu m/s one lobe of the plume flowed 15 km south of the San Francisco-Oakland Bay Bridge while the main lobe flowed seaward 30 km, covering an area of about 900 sq km. Salinity differences of 1-2 parts per thousand and light-transmission differences of 15-20% were measured between the plume and the ambient waters. As the discharge from the Sacramento-San Joaquin River system decreased to 100 cu m/s, the surface area of the plume in the Gulf of the Farallones decreased to about 100 sq km. In south San Francisco Bay, the plume characteristics are different during high and low river discharge. As the discharge decreased from 7,800 cu m/s in the winter to 100 cu m/s in the summer, the flow rate of the plume front into the south bay decreased from 113 cm/s to 65 cm/s. These seasonal changes in flow rates and volumes of this critical water source must be considered when developing physical and chemical models of the estuary. (Knapp-USGS)
W74-13180

RESIDUES IN FISH, WILDLIFE, AND ESTUARIES,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5C.
W74-13317

SURVIVAL OF SALMONELLA TYPHIMURIUM IN ARTIFICIAL AND COASTAL SEA WATER,
Rhode Island Univ., Kingston. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W74-13361

FISH AND SHELLFISH FARMING IN COASTAL WATERS,
P. H. Milne.
Fishing News(Books) Ltd.: London, England. 1972. 208p, Illus. Maps.
Identifiers: Crab, Crustaceans, *Fish farming, Mollusks, *Shellfish farming, *Coastal waters.

Guidance is provided on all aspects needed for success in the field of fish and shellfish in coastal waters. Preliminary chapters emphasize the need for the marine biologist and engineer to work together in this bioengineering field to design and construct adequate facilities for successful sea farming. A general survey is made of the marine species of molluscs, crustaceans, and fish suitable for use. Legal aspects are discussed after which the points for selecting a site are analyzed and the materials to be used tested. Other chapters discuss the design and construction of hatcheries, ponds, raceways and tanks, together with their associated hydraylic and pumping requirements. The techniques for locating, designing and constructing intertidal, sub-littoral and seabed farming facilities are discussed together with the use of floating cages and rafts. Three chapters are devoted to problems to be encountered, including the effect of marine enclosures on environment, the control predators (starfish, crabs, sea birds, etc.) and marine pollution and its effects. Finally, new materials and techniques available in the field are discussed. The book is applicable to all coastal zone activities in any area of the world suitable for sea farming.--Copyright 1973, Biological Abstracts, Inc.
W74-13408

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA, PART II. BIOLOGICAL INVESTIGATIONS.
For primary bibliographic entry see Field 5B.
W74-13461

OBSERVATIONS ON THE HYDROLOGY AND MARINE ORGANISMS OF THE TIDAL COLORADO RIVER AND ADJACENT WATERS, TEXAS, FEBRUARY-JUNE 1962,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
For primary bibliographic entry see Field 5B.
W74-13463

GALVESTON BAY BENTHIC COMMUNITY STRUCTURE AS AN INDICATOR OF WATER QUALITY,
Texas Univ., Port Aransas. Marine Science Inst.
For primary bibliographic entry see Field 5A.
W74-13464

A SPORT FISHING SURVEY IN THE VICINITY OF A STEAM ELECTRIC STATION ON THE PATUXENT ESTUARY, MARYLAND,
Academy of Natural Sciences of Philadelphia, Pa.
C. J. Moore, G. A. Stevens, A. J. Mcerlean, and H. H. Zion.
Chesapeake Sci. Vol 14, No 3, p 160-170. 1973, Illus.

Descriptors: Estuaries, Fishing, *Sport fishing, Recreation, Canals, Effluent streams, Perches, Sport fish, Marine fish, Sea basses, Striped bass, Bass, *Maryland, Electric power plants, Crabs.
Identifiers: *Patuxent estuary(Md), Spot.

An interview-count sport fishing survey was conducted from May 1971-April 1972 within 10,340 acres of the Patuxent Estuary, from Jacks Bay to Holland Cliff, including the effluent canal of the Potomac Electric Power Company's steam electric stations (SES) located at Chalk Point, Maryland. An estimated 41,238 angler trips, totaling 170,535 h, were made within this area of the Patuxent Estuary during the period sampled. These anglers caught 383,900 fish, of which 176,900 were kept and 207,000 were returned to the water. The average angler spent 4.1 h/trip and harvested 1.0 fish/h or 4.0 fish/trip. White perch dominated the catch with 188,200 caught and 102,900 harvested. Of 69,500 striped bass caught, 66,000 were under the legal size limit of 12 in. and were returned to the water. Spot were taken throughout the estuary during June-Oct., with 19,500 being harvested. Small catches of spot continued to be reported only within the heated effluent canal during Nov., Dec. and March. Over 50% of all angler trips were made to the heated effluent canal of the Chalk Point SES, with over 90% of these trips being made during the cooler seasons from Oct.-April when little or no fishing occurred within other areas of the estuary. An estimated 13,500 recreational crabbers spent 59,200 h and harvested 101,700 crabs from May-2 Nov. These crabbers averaged 1.7 crabs/h and 7.5 crabs/trip. Results are compared to a similar sport fishing survey carried out within this area of the Patuxent Estuary prior to the operation of the SES.--Copyright 1974, Biological Abstracts, Inc.

/74-13472

EDIMENTATIONAL REGIMES OF THE ORK RIVER, SOUTHEASTERN VIRGINIA, S SHOWN BY MASS PROPERTIES,
afayette Coll., Easton, Pa. Dept. of Geology.
. W. Faas.
hesapeake Sci. Vol 14, No 3, p 181-187. 1973, lus.

escriptors: Sedimentation, *Rivers, *Virginia, stuaries, *Sediments, Silts, Clays, Deposi-on(Sediments), Physical properties, Soil physical roperties, Soil mechanics, Shear strength, echanical properties, Sediment control, Soil pro-erties.
lentifiers: *York River(Va).

echniques of terrestrial soil mechanics, modified include in situ sampling using scuba gear, owed differences in sediment mass properties etween various reaches of the York River, a astal plain estuary of southeastern Virginia JSA), which are interpreted as delineating areas sediment removal and deposition within the tuary. Sediments found in the upper and por-ons of the estuary are similar in their mass pro-erties. Both are 'silty clays' and possess low unit eight and very high moisture content. The middle tuary contains 'silty clays' possessing high unit eight and lower moisture content. Shearing rength is lowest in the upper estuary, slightly reater in the middle reaches, and much greater in e lower estuary. Deposition is probably proceed-g rapidly in both upper and lower estuarine eas. The middle estuary appears to be a surface sedimentary bypassing. Sediment shearing rength must be considered when planning chan-el modifications. Current velocities which impose ottom shear stresses in excess of measured shear rength will initiate scouring. Design criteria ould include acceptable velocities for given aches of rivers undergoing modifications, given knowledge of mass property distributions.--opyright 1974, Biological Abstracts, Inc.
/74-13473

HE INTERTIDAL LAMELLIBRANCHES OF OUTHAMPTON WATER, WITH PARTICU-AR REFERENCE TO CERASTODERMA DULE AND C. GLAUCUM,
ambridge Univ. (England). Dept. of Zoology.
. S. K. Barnes.
roc Malacol Soc Lond. Vol 40, No 5, p 413-433. 973, Illus.

escriptors: *Mollusks, Estuaries.
dentifiers: Cerastoderma edule, Cerastoderma laucum, *United Kingdom(Southampton Water-ng).

he distribution of 15 spp. of lamellibranch mol-scs and the density and population structure of 2 f them, C. edule and C. glaucum, were in-estigated at 7 sites along Southampton Water England). The fauna of Southampton water con-orms to a variety of the widespread Macoma althica community of sheltered, muddy and often stuarine habitats, including a number of in-roduced species. Only C. edule, Mercenaria mer-enaria and (prior to the summer of 1970) C. glau-um were abundant. The distribution of C. glau-um is at variance with various salinity ypotheses. This species may have been displaced rom brackish habitats into the Water by land eclamation and is probably being displaced now rom the Water by the pre-existing populations of . edule. In the winter of 1969-70, C. glaucum ormed 98% of the cockle population at Hythe but ince Nov. 1970 it formed only 20% and has rarely ccurred in densities exceeding 90/sq m. At the 3 ther stations where C. glaucum occurs, it did not orm more than 5% of the cockle populations, arely occurred in densities greater than 15/sq m nd showed negligible annual recruitment. C. dule occurred in densities of about 20-35/sq m near the mouth of Southampton Water but was abundant in the central regions and near the head. The population structure of C. edule showed, with 1 exception, a trend from a state of 'each annual recruitment forming a large proportion of the total standing crop, a small average size and size range and with few year groups represented in the population' near the head to 'negligible annual recruitment as a percentage of the total population, a large average size and size range, and a stable population with many year groups represented' at the mouth. This trend may be caused by the nature of the substrate. The growth rate of cockles in Southampton Water is negligible at 1 site and from low to moderate at others.--Copyright 1974, Biological Abstracts, Inc.
W74-13474

A TRAWL STUDY OF NEARSHORE FISHES AND INVERTEBRATES OF THE GEORGIA COAST,
University of Southwestern Louisiana, Lafayette. Dept. of Biology.
H. D. Hoese.
Contrib Mar Sci. 17 p, 63-98. 1973, Illus.

Descriptors: Fish, *Invertebrates, *Georgia, Seawater, Aquatic animals, Marine fisheries, Commercial fishing, Estuaries, Coasts.
Identifiers: Diplectrum-formosum, Hemipteronotus-novacula, *Nearshore fishes, Penaeus-setiferus, Stellifer-lanceolatus, Turbidity.

A trawl study was conducted for a 12 mo. period in 1956-66 on the central Georgia inshore continental shelf and adjacent Doboy Sound. Hydrographic data showed the area to be relatively salty, apparently subject to major influence by the Altamaha River, winds, but rarely by longshore currents. Turbidity best delineated the water masses with clear oceanic water about 6 miles offshore, occasionally with intermediate waters. The distribution of many species of motile invertebrates and fishes correlated with either the water masses of sediment type which became coarser offshore. The inshore fauna, a warm temperate one, was characterized by Stellifer lanceolatus and Penaeus setiferus. Offshore the fauna became subtropical, characterized by Diplectrum formosum and Hemipteronotus novacula. A small cool temperate fauna invaded during winter. The absence of large benthic plant communities excludes the large fauna associated with it. However, the turbidity limiting plant growth was associated with up to 8 times the biomass found in clearer offshore waters. There was no evidence gathered indicating any potential unexploited commercial fisheries.--Copyright 1974, Biological Abstracts, Inc.
W74-13475

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

DISTILLATION APPARATUS,
J. D. Wixson.
US Patent No 3,827,945, 4 p, 4 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 925, No 1, p 233, August 6, 1974.

Descriptors: *Patents, *Desalination apparatus, *Distillation, Evaporation, *Condensation, Sea water, Fresh water, Heat exchangers.

This apparatus provides a distillation system in which heat flows from the fluid being cooled to the fluid being heated in a manner which is essentially recirculating counterflow exchange. This specifically includes counterflow heat exchange between the raw liquid entering the system on one hand and the condensate and concentrate leaving the system on the other; recovery of heat of condensation from the condenser and reintroduction of this heat into the evaporator; and counterflow heat exchange from the cooling superheated gas or steam to that vapor which has just evaporated and is being superheated to remove entrained impurities. (Sinha-OEIS)
W74-12804

DRAINAGE AND LAND RECLAMATION IN THE LOWER MESOPOTANIAN PLAIN,
International Agricultural Centre, Wageningen (Netherlands).
For primary bibliographic entry see Field 4A.
W74-13148

HYGIENIC EVALUATION OF POLYMERS USED IN THE MEMBRANE METHODS OF WATER DESALINATION (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Selskoi Gigieny, (USSR).
For primary bibliographic entry see Field 5D.
W74-13159

THE POTENTIAL ROLE OF MODERN DESALINATION TECHNOLOGY IN THE DEVELOPMENT OF FRESH WATER SUPPLIES IN UNDER-DEVELOPED TERRITORIES,
C. Peel.
Water Service, Vol 78, No 938, p 119-123, April 1974. 3 fig, 1 tab.

Descriptors: *Desalination, *Desalination plants, *Desalination processes, Membrane processes, Water supply, Chemical reactions.

Estimates of the future world population growth rate, food supply, and fresh water needs are discussed briefly. Statistics on presently installed and operating desalination plants are given. The various desalination techniques presently available or under development are outlined under the following headings: processes involving a change of phase, methods utilizing some form of membrane, and processes based on a chemical reaction. (Sandoski-FIRL)
W74-13435

3B. Water Yield Improvement

SURFACE WATER RESOURCES OF THE USSR AND THEIR CHANGE UNDER THE EFFECT OF INDUSTRIAL AND AGRICULTURAL ACTIVITY,
For primary bibliographic entry see Field 4A.
W74-12983

JOJOBA: A WAX-PRODUCING SHRUB OF THE SONORAN DESERT, LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 2I.
W74-13141

DESERT ECOSYSTEMS: ENVIRONMENT AND PRODUCERS,
Hebrew Univ., Jersualem (Israel). Dept. of Botany.
For primary bibliographic entry see Field 2A.
W74-13150

POTENTIAL CUMULUS RAINFALL MODIFICATION, PANAMA CANAL ZONE,
Environmental Prediction Research Faculty (Navy), Monterey, Calif.
P. Lowe.
Available from NTIS, Springfield, Va. 22161 as AD-775 616, Price $3.25 printed copy; $2.25 microfiche. Technical Paper No 10-73, December 1973. 18 p, 20 tab, 2 ref.

Descriptors: *Weather modification, *Cloud seeding, Artificial precipitation, Simulation analysis, *Canal Zone.
Identifiers: Panama.

Natural and modified cumulus clouds appropriate to the Panama Canal Zone were analyzed by computer simulation to derive tables of the probability of increasing or decreasing rainfall, the expected amounts of rainfall increase or decrease, and indices of potential yield arising from cumulus cloud modification. Clouds of 1.5 km radius have the highest potential. The larger the cloud, the greater the absolute yield. On days when cumulus rainfall is forecast, modification will result in a better water yield. The month of November has more seeding potential than the season in general. (Knapp-USGS)
W74-13168

QUANTITATIVE AND HISTORICAL EVIDENCE OF VEGETATION CHANGES ALONG THE UPPER GILA RIVER, ARIZONA,
Geological Survey, Tucson, Ariz.
R. M. Turner.
Professional Paper 655-H, 1974. 20 p, 10 fig, 2 tab, 4 ref.

Descriptors: *Channel morphology, *Phreatophytes, *Arizona, *Tamarisk, Riparian plants, Flood plains, Vegetation effects, Geomorphology.
Identifiers: *Saltcedar, *Gila River(Ariz).

Vegetation maps showing past conditions along a 24-kilometer (about 15-mile) reach of the upper Gila River valley were compared with a recent vegetation map to determine changes in vegetation. The maps, which were made during 1914, 1937, 1944, and 1964, provide a quantitative record of changes through half a century. Historical records and recent surveys show that the width of the Gila River channel has changed from narrow (pre-1900) to broad (early 1900's), to narrow (1960). The vegetation has not changed in a similar cyclic manner - the vegetation adjacent to the narrow channel of a century ago was vastly different from that adjacent to the narrow channel of the 1960's. During the last period (1944-1964), saltcedar, an introduced species has dominated the low areas bordering the channel, having replaced such native species as seepwillow and cottonwood. Possible causes for the altered conditions are channel changes, dam construction, changes in frequency of fires, altered streamflow pattern, and the effect of saltcedar introduction. The time of the plant's most rapid expansion outside the limits of the reservoir did not coincide with any major disruption of the flood-plain environment. Saltcedar can eliminate native riparian species, such as cottonwood and seepwillow, without the aid of environmental alterations. (Knapp-USGS)
W74-13174

THE ROLE OF ELECTRICAL FORCES IN THE DEVELOPMENT AND DISSIPATION OF CLOUDS AND FOGS,
University of Manchester Inst. of Science and Technology (England). Dept. of Physics.
J. Latham, and M. H. Smith.
Available from NTIS, Springfield, Va 22161 as AD-777 010, Price $3.25 printed copy; $2.25 microfiche. Manchester University Institute of Science and Technology, Final Technical Report, December 1973. 21 p, 4 tab, 14 ref. DAJA37-73-C-1623.

Descriptors: *Cloud physics, *Weather modification, *Rainfall, *Fog, Electrical studies, Raindrops, Rain, Evaporation.

The influence of evaporation and drop-interactions on a rainshaft and the feasibility of dispersing fogs by electrical forces were studied in laboratory experiments. The interactions are described by a generalized stochastic equation which takes account of the variation of coalescence efficiency with drop radii and the fact that satellite drops are produced when drops separate after collision. Calculations were made for 3 different situations in order to isolate the physical processes which most affect the rainfall: (1) evaporation without interaction; (2) interaction without evaporation; (3) both interaction and evaporation. The presence of high charges on drops greatly increases the rate at which they coalesce with smaller droplets. The introduction of charged drops can possibly provide a feasible technique for the dispersion of quiescent warm fogs over airport runways. (Knapp-USGS)
W74-13199

ICE PROJECT-ICE CRYSTAL INHIBITION-AN APPLICATIONS PROGRAM OF CHEMICAL DISPERSAL IN SMALL CUMULUS CLOUDS,
Atmospherics, Inc., Fresno, Calif.
T. J. Henderson, and D. W. Duckering.
Available from NTIS, Springfield, Va 22161 as AD-775 630, Price $3.75 printed copy; $2.25 microfiche. Final Report to Naval Weapons Center, Earth and Planetary Sciences Division, June 15, 1973. 35 p, 22 fig. NWC Contract NO0123-72-C-1723.

Descriptors: *Cloud seeding, *Weather modification, Organic compounds, Freezing, Crystal growth, Cloud physics, Ice.
Identifiers: *Ethylamine, *Morpholine.

Ethylamine and morpholine were tested for their effects of cumulus cloud developments. Morpholine when applied in the inflow area at cloud base and within a temperature regime warmer than 0 deg C may inhibit ice crystal formation and growth in those cases where cloud top temperatures are colder than -9 C and glaciation has been noted in untreated control clouds. Ethylamine when applied to the inflow area at cloud base and within a temperature regime warmer than 0 dec C, may enhance ice crystal formation and growth in those cases where glaciation was not observed prior to treatment. Ethylamine enhances the process of ice crystal growth and possibly formation. Morpholine increases intensities and areal extent of precipitation. (Knapp-USGS)
W74-13212

EXPERIMENTS SUPPORTING A PROGRAM OF WARM FOG DISPERSAL BY ELECTRICAL CHARGE INJECTION,
Naval Postgraduate School, Monterey, Calif.
G. E. Schacher, and W. Reese.
Available from NTIS, Springfield, Va 22161 as AD-775 911, Price $3.75 printed copy; $2.25 microfiche. Report NPS-6 SqRc74011 (Final report for period January 1973-January 1974), January 28, 1974. 39 p, 6 fig, 3 tab, append.

Descriptors: *Fog, *Weather modification, *Electrical studies, Cloud physics, Electrical coronas, Extra high voltage.
Identifiers: *Fog clearing, *Fog dispersal.

Fog clearing by injection of electrical charges into the fog was studied by experiments made to determine the charge transferred to water sprays. Contact charging mechanisms were as much as 1 million times as effective as induction charging mechanisms. The charge on soap film bubbles was measured. For a 2-inch bubble formed at 30 kV the charge was on the order of 1 microcoulomb. Tests of fog clearing in an environmental chamber indicated fair results with water spray techniques and much better results with techniques by which charge is injected directly into the atmosphere (corona injection). Preliminary tests of corona injection into the atmosphere showed that considerable charge attached to windborne particles. (Knapp-USGS)
W74-13216

ALPINE LAKE PROJECT ALPINE, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.
For primary bibliographic entry see Field 4A.
W74-13224

HYGIENIC FEATURES OF PERCOLATIO WATER INTAKES (IN RUSSIAN),
Municipal Sanitary-Epidemiological Cente Pyatigorsk (USSR).
For primary bibliographic entry see Field 4B.
W74-13400

3C. Use Of Water Of Impaired Quality

CALCIUM CARBONATE EQUILIBRIA I SOILS AND IN IRRIGATION WATERS,
New Mexico State Univ., Las Cruces. Dept. Agronomy.
For primary bibliographic entry see Field 2G.
W74-12862

CONFERENCE ON RECYCLING TREATE MUNICIPAL WASTEWATER THROUG FOREST AND CROPLAND.
Pennsylvania State Univ., University Park. Ins for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W74-12869

WASTEWATER TREATMENT: WATE RECLAMATION AND REUSE,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W74-12939

SHELLFISH CULTURE USING THE HEATE EFFLUENT FROM ELECTRIC POWE PLANTS,
Connecticut Univ., Storrs. Inst. of Wate Resources.
For primary bibliographic entry see Field 5C.
W74-13045

DRAINAGE AND LAND RECLAMATION I THE LOWER MESOPOTANIAN PLAIN,
International Agricultural Centre, Wageninge (Netherlands).
For primary bibliographic entry see Field 4A.
W74-13148

QUALITY OF GROUND WATER IN BIKANE DISTRICT OF WESTERN RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India)
For primary bibliographic entry see Field 4B.
W74-13151

SALT PROFILES OF SOILS: INVESTIGA TIONAL METHODS AND LEVEL OF SIG NIFICANCE: APPLICATION TO HALOMORPHIC SOILS IN SOUTHERN FRANCE (IN FRENCH),
Institut National de la Recherche Agronomique Montpellier (France). Service d'Etudes des Sosl.
For primary bibliographic entry see Field 2G.
W74-13162

PREDICTED QUALITY OF J. G. STRIJDOM DAM WATER AND ITS SUITABILITY FOR IR RIGATING CERTAIN MAKATINI SOILS,
Fort Hare Univ. (South Africia).
M. Hensley.
Agrochemophysica. Vol 4, No 2, p 21-24, 1973.
Identifiers: Carbonate, Sodium, Strijdom dam Salts, *Irrigation water.

A procedure for predicting the composition of the dam water is outlined. The estimated composition is presented. It is found to be C2-S1. More detailed assessment of quality making allowance for carbonate precipitation as a result of concentration of the soil solution between irrigations is described. An alternative procedure for assessing the Na hazard is outlined. The dam water will probably have no significant salinity hazard, but under certain conditions the Na hazard may be significantly high.--Copyright 1973, Biological Abstracts, Inc.
W74-13248

THE EFFECT OF WATER-SALT REGIME OF SOIL ON THE GROWTH OF QUERCUS ROBUR, (IN BYCLORUSSIAN),
R. S. Lavryshcheva.
Visn Sil'skohospod Nauk. 5. 73-76. 1970. Russian summary.
Identifiers: Quercus Robur, Salts, Soils, *Oak trees, *Saline soils.

The growth of oak in relation to the humidity and salinity of soil of 2 plots was studied in the floodplain of the Samara River, USSR, in 35-yr-old plantations on chernozem-meadow soils of low salinity (Plot A) and chernozem-meadow soils of high salinity (Pilot B). There was 50% less wood standing volume and 20% less timber standing volume in plot B then in plot A. At 5 yr of age, the height of oak in these plots was 0.9 and 2.0 m, respectively. Increment culmination of oak occurred at 15-25 yr of age, constituting 0.4-0.5 m annually in plot A, and 0.2-0.4 m in plot B. The insignificant moistening of soils on both plots is pointed out. The highest soil humidity (12-17% by weight) was at a depth of 30-150 cm (Plot B) due to the poor permeability of salinized soils to water. The water-soluble salt content in plot A was insignificant (dry residue 0.040-0.086%; pH=6.4-7.1); in plot B it was considerably higher (on the average, dry residue is 0.074-0.336%, pH=7.1-8.2), attaining a maximum in the 100-150 cm layer. On the more salinized soils with a dry residue of chlorides, sulfates of Na and soda of 0.426-0.582% and pH-8.4, the death of yound oak trees occurred. Oak on the salinized soil of the Samara River floodplain is obviously a salt-resistant species.--Copyright 1973, Biological Abstracts, Inc.
W74-13393

RESPONSE OF SAFFLOWER (CARTHAMUS TINCTORIUS L.) TO SALINITY OF SEA WATER,
Central Salt and Marina Chemicals Research Inst., Bhavnagar (India).
T. Kurian, and E. R. R. Iyengar.
Indian J Agric Sci. Vol 42, No 8, p 717-721, 1972. Illus.

Descriptors: *Sea water, Salinity, Salt tolerance, Irrigation.
Identifiers: Carthamus tinctorius, Safflower.

In pots containing shore sand, 45-day-old seedlings of C. tinctorius were irrigated with seawater of 15,000 and 20,000 ppm and its amendments with Hoagland solution. Irrigations given at an interval of 4-6 days reduced the height of plants, the yield of grains and 1000-grain weight from the primary and secondary heads. Sea-water of 20,000 ppm with Hoagland's solution was ineffective in increasing the yield of the grains from the secondary heads. The oil content was not markedly affected by salinity of sea-water or its amendments. There was accumulation of minerals in leaves and stem. Amendment of sea-water with Hoagland's solution resulted in a reduction in the uptake of Na and an accumulation of N, K and Ca by the crop. Safflower was found moderately tolerant to sea-water irrigations; considerable improvement was achieved with proper amendment of sea-water.--Copyright 1973, Biological Abstracts, Inc.
W74-13462

3D. Conservation In Domestic and Municipal Use

DEVELOPMENT OF CRITERIA FOR EVALUATING URBAN RIVER SETTINGS FOR TOURISM-RECREATION USE,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 6B.
W74-12866

ESTABLISHMENT OF A CLOSED SYSTEM FOR THE PAPERMAKING PROCESS,
Mo och Domsjo A.B., Ornskoldsvik (Sweden).
For primary bibliographic entry see Field 5D.
W74-12944

A CONCEPTUAL AND EMPIRICAL ANALYSIS OF WATER PRICING IN MISSISSIPPI MUNICIPALITIES,
Mississippi Univ., Oxford. Bureau of Business and Economic Research.
For primary bibliographic entry see Field 6B.
W74-13054

NATURAL RESOURCE INVENTORY FOR URBAN PLANNING UTILIZING REMOTE SENSING TECHNIQUES,
Arizona Univ., Tucson. Office of Arid Lands Studies. Office of Arid Lands Studies, Arizona Univ., Tucson.
For primary bibliographic entry see Field 6B.
W74-13143

ENVIRONMENTAL ASSESSMENT OF WATER-SYSTEM IMPROVEMENTS,
East Bay Municipal Utility District, Oakland, Calif.
For primary bibliographic entry see Field 5G.
W74-13265

COMPUTERIZED REPORTS IMPROVE SEWER MAINTENANCE,
For primary bibliographic entry see Field 5G.
W74-13339

WATER POLLUTION ASPECTS OF STREET CONTAMINANTS,
Illinois State Univ., Normal. Coll. of Applied Science and Technology.
For primary bibliographic entry see Field 5B.
W74-13411

A MATHEMATICAL EXAMINATION OF URBAN RUN-OFF PREDICTION,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 4C.
W74-13449

3E. Conservation In Industry

ANALYSIS OF WATER CHARACTERISTICS OF MANUFACTURING INDUSTRIES AND THEIR ADAPTABILITY TO SEMI-ARID REGIONS,
New Mexico Univ., Albuquerque. Dept. of Economics.
S. Ben-David, F. L. Brown, Jr., H. G. Folster, and E. F. Thode.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 280, $6.25 in paper copy, $2.25 in microfiche. New Mexico Water Resources Research Institute, Las Cruces, Report 040, June 1974. 155 p, 12 fig, 33 tab, 126 ref, 3 append. OWRT B-032-NMEX(1).

Descriptors: *Water requirements, *Industrial water, *Industrial wastes, *Oil industry, *Coals, Industrial plants, Water pollution sources, Water pollution treatment, Water consumption, Economic feasibility, Biological treatment, *New Mexico, Water demand, Arid lands, Southwest US.
Identifiers: *Coal gasification, *Petroleum refining, *Waste treatment costs, Physical-chemical treatment.

Historically arid and semi-arid areas of the Southwest have exhibited almost a complete dearth of manufacturing processes. Such areas must give more careful and considered thought to the water related impact of an industry than has generally been the case. Three significant categories into which an industrial water-using firm's impact can be classified are: (1) the polluting effect of its effluent, (2) its withdrawal demand for new water, and (3) its consumptive use of water. For informed planning more information is required concerning the present operating characteristics of major water-using industries in these categories and their technological ability to adapt to the economic and environmental conditions in the Southwest. The industries chosen for study were petroleum refining and coal gasification. Selection criteria were a probability of the industry locating in New Mexico, a differing water use pattern, and process substitution possibilities. Attention is given to process descriptions. Brief discussions are presented of the major New Mexico river and water basins, water quality measurement concepts, and wastewater treatment processes currently being used or having a high potential for use. The results should permit a ranking of other industries from a water-use viewpoint through the application of the concepts presented and to allow comparative evaluations. (Hain-New Mexico State)
W74-12863

THE FLOW OF MERCURY IN SOCIETY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12919

MITSUBISHI FLOTATION DEINKING SYSTEM SAVES WATER, STEAM AND CHEMICALS.
Japan Pulp and Paper, Vol 11, No 2, p 53-55, July 1973. 9 fig.

Descriptors: *Pulp wastes, *Industrial water, *Water conservation, *Flotation, *Pulp and paper industry, *Foreign research, Fibers(Plant), Solid wastes, Industrial wastes, Dispersion, Operation and maintenance, Waste treatment, Recycling, Steam, Additives, Chemicals.
Identifiers: Japan, *Deinking, Waste papers, Printing inks, Inks.

Significant reductions in the consumption of industrial water, steam, and chemical additives are reported for a waste paper deinking, fiber recovery, and pulp stock preparation system developed jointly by Mitsubishi Heavy Industries, Ltd. and Mitsubishi Metal Mining Co., Ltd. in Japan. Both the fiberization of collected printed waste papers and the separation and dispersion of ink particles are carried out at relatively high stock consistencies (6.5-9.0% fiber solids). Schematic outlines of the equipment are given. Effects of operating variables on the resulting paper pulp are also illustrated. (Witt-IPC)
W74-12926

SAVING ENERGY THROUGH RECYCLING PAPER MILL PROCESS WATER,
For primary bibliographic entry see Field 5D.
W74-12952

MAN BITES DOG: THE TALE OF HOW A PULP MILL WAS RESCUED FROM BEING POLLUTED TO DEATH,
Alliance Paper Mills Ltd., Merritton (Ontario).
For primary bibliographic entry see Field 5G.
W74-12955

INTENSIFICATION OF SAND FILTER OPERATION (INTENSIFIKATSIYA RABOTY PESCHENYKH FIL'TROV),
All-Union Research Inst. for the Paper Industry, Astrakhan (USSR).
For primary bibliographic entry see Field 5D.
W74-12958

REDUCTION OF WASTE WATER POLLUTION IN PAPERBOARD MILLS (SNIZHENIE ZAGRYAZNENIYA STOCHNYKHVOD NA KARTONNYKH FABRIKAKH),
Ukrainskii Nauchno-Issledovatelskii Institut Bumagi, Kiev (USSR).
For primary bibliographic entry see Field 5D.
W74-12961

NEW ENERGY TECHNOLOGY RESEARCH AND DEVELOPMENT: A RATIONALE FOR SETTING PRIORITIES,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 6B.
W74-13123

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED BRAIDWOOD STATION, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-13129

IRON: A TWO-EDGED SWORD.
For primary bibliographic entry see Field 5D.
W74-13267

ATMOSPHERIC COOLERS FOR COOLING INDUSTRIAL WATERS,
For primary bibliographic entry see Field 5D.
W74-13275

EFFLUENT TREATMENT AT PLESSEY CO LTD.
For primary bibliographic entry see Field 5D.
W74-13308

RATIONAL ORGANIZATION OF WATER CONSUMPTION IN THE WOOD PREPARATION ROOM OF PULP AND PAPER MILLS (ORGANIZATSIYA RATSIONAL'NOGO VODOPOL'ZOVANIYA V DREVESNOPODGOTOVITEL'NYKH TSEKHAKH TSELLYULOZNO-BUMAZHNYKH PREDPRIYATII),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshlennosti, Leningrad (USSR).
A. S. Vinograd.
Issledovaniya v Oblasti Proizvodstva Polufabrikatov i Ochistki Promyshlennykh Stokov, Sbornik Trudov VNNIB, No 61, p 204-211, 1972. 1 tab.

Descriptors: *Pulp and paper industry, *Water consumption(Except consumptive use), *Water conservation, *Industrial water, *Pulp wastes, Discharge(Water), *Water pollution control, *Wood wastes, Bark, Waste water(Pollution), Industrial wastes.
Identifiers: Pulpwood, Logs(Pulpwood), Storage ponds, Woodrooms(Pulp mill), Barking(Debarking), USSR.

Water consumption in most woodrooms of the USSR accounts for ca. 10-12% of the total water consumed by a pulp and paper mill. Average daily consumption in woodrooms of large mills is 60,000 to 80,000 cu m. An approximately equal volume of water polluted by bark plus organic and inorganic dissolved materials is being discharged into natural waters. About 4 to 8 cu m of water is consumed in barking 1 solid cu m of wood. A water-use survey of 13 Soviet mills in 1969-70 led to a collection of typical data and to practical recommendations for water conservation. It is estimated that water consumption can be lowered to a 2-3 cu m per solid cu mof wood by discontinuing water use for pulpwood transport, by instituting strict accounting and control of water consumption, and by building special log-thawing and log-storage ponds. (Stapinski-IPC)
W74-13426

3F. Conservation In Agriculture

IRRIGATION RISER BASE SYSTEM,
Coca-Cola Co., Atlanta, Ga. (assignee).
R. H. Heenan, and G. M. Litsinger.
US Patent No 3,825,186, 4 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 924, No 4, p 903, July 23, 1974.

Descriptors: *Patents, *Irrigation systems, *Soil water movement, Equipment.
Identifiers: Irrigation riser.

This system comprises a riser base having a central longitudinal tube manufactured of a plastic material with fin portions. The fins extend from the top to the bottom of the riser base to take advantage of the soil resistance capabilities. A locking screw cap and O-ring assembly are provided on the top of the riser base to create a quick release coupling seal and prevent leakage between the central tube and riser pipe. The longitudinal tube is adapted to couple with the riser pipe and a check valve assembly is provided at the bottom of the riser base to prevent the flow of irrigation water when the riser pipe is removed for cleaning. (Sinha-OEIS)
W74-12801

CONFERENCE ON RECYCLING TREATED MUNICIPAL WASTEWATER THROUGH FOREST AND CROPLAND.
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W74-12869

SITE SELECTION CRITERIA FOR WASTEWATER DISPOSAL -- SOILS AND HYDROGEOLOGIC CONSIDERATIONS,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
For primary bibliographic entry see Field 5D.
W74-12875

RENOVATION OF MUNICIPAL WASTEWATER THROUGH LAND DISPOSAL BY SPRAY IRRIGATION,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12876

PHOSPHORUS AND NITRATE LEVELS IN GROUNDWATER AS RELATED TO IRRIGATION OF JACK PINE WITH SEWAGE EFFLUENT,
Forest Service (USDA), Cadillac, Mich. North Central Forest Experiment Station.
For primary bibliographic entry see Field 5D.
W74-12878

VEGETATION RESPONSES TO IRRIGATION WITH TREATED MUNICIPAL WASTEWATER,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W74-12885

ANATOMICAL AND PHYSICAL PROPERTIES OF RED OAK AND RED PINE IRRIGATED WITH MUNICIPAL WASTEWATER,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W74-12886

DEER AND RABBIT RESPONSE TO THE SPRAY IRRIGATION OF CHLORINATED SEWAGE EFFLUENT ON WILD LAND,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W74-12887

SPRINKLER IRRIGATION SYSTEMS: DESIGN AND OPERATION CRITERIA,
Pennsylvania State Univ., University Park. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-12888

COST OF SPRAY IRRIGATION FOR WASTE WATER RENOVATION,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12889

LARGE WASTEWATER IRRIGATION SYSTEMS: MUSKEGON COUNTY, MICHIGAN AND CHICAGO METROPOLITAN REGION,
Bauer Engineering, Inc., Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-12891

MT. SUNAPEE STATE PARK, NEW HAMPSHIRE SPRAY IRRIGATION PROJECT,
New Hampshire Water Supply and Pollution Control Commission, Concord.
For primary bibliographic entry see Field 5D.
W74-12893

UTILIZATION OF SPRAY IRRIGATION FOR WASTEWATER DISPOSAL IN SMALL RESIDENTIAL DEVELOPMENTS,
Williams and Works, Inc., Grand Rapids, Mich.
For primary bibliographic entry see Field 5D.
W74-12894

MUNICIPAL WASTEWATER DISPOSAL ON THE LAND AS AN ALTERNATE OF OCEAN OUTFALL,
Bauer Engineering, Inc., Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-12896

SPRAY IRRIGATION--THE REGULARTORY AGENCY VIEW,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Ground Water Quality Management Unit.
For primary bibliographic entry see Field 5D.
W74-12900

EFFECT OF FLOODING AND CROPPING ON THE CHANGES IN THE INORGANIC PHOSPHATE FRACTIONS IN SOME RICE SOILS,
University of Agricultural Sciences, Mandya (India). Regional Research Station.

or primary bibliographic entry see Field 2G.
74-12925

CREASE IN CONDUCTIVITY OF IRRIGA-ON WATER DURING SPRINKLING,
lifornia Univ., Davis. Dept. of Water Science d Engineering.
E. Robinson.
gron J. Vol 65, No 1, p 130, 1973.

escriptors: *Conductivity, Water properties, alinity, *Sprinkler irrigation, Irrigation, Desert. entifiers: Medicago-sativa.

e test was conducted on a high evaporative de-and July day to evaluate the possible harm that uld result from concentration of salinity as ter is sprinkled in an arid desert area. tchment beakers (250 ml) were set at 19-m inter-ls across a 190-x 219-m alfalfa (Medicago sativa) field that was sprinkled for 19.5 hr. Conductivi-of the sprinkler water increased 21% on the field ge and 4.4% inside the field.--Copyright 1973, ological Abstracts, Inc.
74-12966

IE INFLUENCE OF SOIL CONDITIONERS N STRUCTURE AND YIELDS IN HORTICUL-URAL SUBSTRATES, (IN GERMAN),
Rasp.
Pflanzenernaehr Bodenkd. Vol 133, No 1/2, p 1-123. Illus. 1972. English summary.

escriptors: *Crops, *Crop response, *Fertilizers, trogen, Soils, Loam, Grasses, Sands, Vegeta-n establishment.
entifiers: Compost, Hygromull, Hygropor-73, nd, Foams, Synthetic foams.

e effects of additions synthetic foams ygromull and Hygropor 73 to compost, sand and am were studied. Yield (pasture grass) increased th the addition of Hygromull, but the highest eld was found with the addition of Hygropor 73. e amount of N in the plant increased parallel to e yield and the highest amount was in the variant th Hygropor 73. Apparent specific weight of soil creased significantly by addition of Hygromull d Hygropor 73. Total pore volume increased on dition of Hygromull, but compared to the vari-t with 50 Vol.% Hygromull Hygropor 73 duced it. Air permeability after Kmoch in-eased on addition of foam substances, especially compost and loam, in sand only in the variant thout vegetation. Water content below pF 2.54 as significantly increased; however, there was difference between pH 2.54 and 4.2.--Copyright 74, Biological Abstracts, Inc.
74-13022

RESOWING IRRADIATION OF SEEDS OF GRICULTURAL PLANTS,
or primary bibliographic entry see Field 5C.
74-13115

PPLICATION OF REMOTE SENSING TO ATE AND LOCAL GOVERNMENT (ARSIG),
rizona Univ., Tucson. Office of Arid Lands Stu-es.
or primary bibliographic entry see Field 6F.
74-13140

ATER BUDGET ESTIMATION IN BELLARY EGION,
dian Council of Agricultural Research, Bellary. uthern Regional Soil Conservation Research ib-Station.
or primary bibliographic entry see Field 2D.
74-13145

ITROGEN FERTILIZATION OF FODDER ORGHUM M. P. CHARI (SORGHUM BICOLOR) GROWN UNDER RAINFED CONDITIONS,
Indian Grassland and Fodder Research Inst., Jhansi.
C. T. Abichandani, A. S. Gill, R. K. Maurya, and N. D. Mannikar.
Annals of Arid Zone, Vol 12, No 1 and 2, p 71-76, March and June, 1973. 2 tab, 3 ref.

Descriptors: *Sorghum, *Nitrogen, *Fertilization, *Forage sorghum, Rainfall, Soils, Moisture tension, Proteins, Droughts, Clay loam, Sands.

Fodder sorghum cultivar M. P. Chari is grown under both rainfed and irrigated conditions because it is palatable to milch animals. A high demand is made of soil fertility, particularly nitrogen. Studies were made to determine the nitrogen needs and the levels of application necessary to refertilize the soil under rainfed conditions. Trials were conducted in two fields having different soil types, one a deep clay loam, and another a sandy loam. Treatments were carried out over a two-year period. Results were based on production of green fodder, dry matter, and crude protein content. Types of application were basal and split. Yields increased significantly in all cases with nitrogen application. Split application gave no advantage over basal application, and crude protein content increased during low rainfall years. (Mastic-Arizona)
W74-13146

INTERRELATIONSHIPS BETWEEN QUANTITATIVE GEOMORPHIC CHARACTERISTICS OF THE DRAINAGE BASINS IN SUB-HUMID TO HUMID ENVIRONMENT OF RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 4A.
W74-13147

FORECASTING YIELD OF WHEAT AND BARLEY FROM METEOROLOGICAL FACTORS IN RAIN-FED AREAS OF IRAQ,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
G. Gangopadhyaya, and N. A. Zaki.
Technical Bulletin 66, July 1974. 15 p, 4 tab, 8 ref.

Descriptors: *Forecasting, *Barley, *Wheat, *Crop production, *Meteorological data, Rainfall, Temperature, Regression analysis.
Identifiers: *Iraq.

Rainfall and temperature data were used to develop formulae for two principal cereal crops, wheat and barley, in Iraq. Rainfall from October to May, and total rainfall for January and April were factors that significantly influenced the yields. In addition, the average temperature for the months of January, March, April, and November had a significant effect on wheat yields. There did not appear to be any correlation between temperature and barley yields. Results are tentative, and require improvement based on additional meteorological data. (Mastic-Arizona)
W74-13154

RESOLVING WATER RESOURCE RIDDLES,
Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
E. Gere.
The Minnesota Volunteer, p 2-10, January-February, 1973. 2 illus.

Descriptors: *Minnesota, *Drainage programs, *Drainage practices, *Drainage effects, *Water resources development, Water policy, Administration, Governments, Wildlife conservation, State governments, Federal government, Adoption of practices, Land reclamation, Farm management, Land management, Surface water, Groundwater, Water supply, Resource allocation, Sedimentation, Algal blooms, Environmental effects, Eutrophication, Water law.

Contradictory objectives and projects exist within Minnesota's water resources program. Drainage and its impact are two current sources of debate. Minnesota has reclaimed more land through drainage than any other state except Indiana. Huge amounts of money are expended in draining new land and maintaining existing drainage systems. Yet at the same time the government pays individuals to keep land out of production. Both state and federal governments have bought large tracts of land to be maintained as natural wetlands. The Federal National Water Bank Program appropriated money to subsidize landowners who will retain water on their land. More important is the deleterious effect on the natural environment generated by drainage programs. Drainage lowers the ground water table, may adversely affect water quality particularly through sedimentation, and destroys recreation areas and wildlife habitat. Drainage need not be stopped but a consideration of the overall environmental impact should be taken into account. Another major problem area is irrigation and water appropriation. Research and regulation are needed to optimize the use of groundwater resources. In addition, eutrophication in lakes has continually accelerated as shore development continues. (Barnes-Florida)
W74-13230

AGRICULTURAL DRAINAGE AND THE PUBLIC INTEREST, (PART I),
Minnesota Dept. of Natural Resources, St. Paul.
W. G. Peterson.
The Minnesota Volunteer, p 37-43, January-February, 1972. 3 illus.

Descriptors: *Agriculture, *Marsh management, *Minnesota, *Drainage effects, *Water resources development, Public benefits, Resource allocation, Natural resources, Ground water resources, Conservation, Resource development, Water supply, Water quality, Mosquitos, Sedimentation, Eminent domain, Taxes, Legal aspects, Water law, Drainage practices, Drainage, Drainage programs, State governments, Federal government, Surface water, Groundwater.

The Minnesota drainage program was conceived in 1883, following several extremely wet summers. It was also a time when there was a shortage of tillable cropland. The drainage program, which consists of a series of taxes and eminent domain proceedings, has been based upon benefitting the general public welfare. Since its inception the Public benefits derived from drainage programs have been highly questionable. Currently, the need for more cropland is questionable since the federal government subsidizes farmers to keep land out of production. Reclaimed marshland is usually poor cropland. The public is not benefitted by less mosquito habitat since malaria carrying mosquitoes occur infrequently in Minnesota. Generally only enough water is romoved to kill mosquito larvae predators, but not the mosquito larvae. Moreover, the detrimental effects on the environment may far outweigh any general public benefits. Although the individual farmer may want wetlands, the effect of rising costs and taxes requires that the farmer increase production to make ends meet. If through use of marginal farm land, many farmers do raise their output, the glut of the market drives prices down. (Barnes-Florida)
W74-13232

SOME REMARKS CONCERNING THE ACTION OF IAA ON TRANSPIRATION EXAMINED AT THE FIRST VEGETATIVE STAGE OF TRITICUM DURUM VAR. OUED ZENATI 368, (IN POLISH),
Instytut Hodowli i Aklimatyzacji Roslin, Warsaw (Poland). Zaklad Biofizyki Roslin.
For primary bibliographic entry see Field 2D.
W74-13259

DESERT PLANTS AS INDICATORS OF LAND FITNESS FOR AGRICULTURAL RECLAMATION, (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSSR, Ashkhabad. Institut Botaniki.
B. B. Kerbabaev, and E. A. Ataev.
Probl Osvoeniya Pustyn. 2. p 12-17, 1973, Illus, English summary.
Identifiers: USSR, Arid regions, *Plant indicators, *Land reclamation.

Some plants from piedmont plains in arid regions are indicators of deluvial-proluvial deposits. Change in the relief and soil conditions causes regular changes in plant communities. Data are given on the interrelationship between the vegetation and soil types in the Kopetdagh piedmont plain (USSR). One of the ecological profiles is described in which 5 associations of indicator value are given. Plant communities can be used as indicators by the agricultural reclamation of these lands.--Copyright 1973, Biological Abstracts, Inc.
W74-13261

WATER QUALITY PROBLEMS ARISING FROM IRRIGATION RETURN FLOW,
Bengal Engineering Coll., Howrah (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W74-13322

POLYPHENOLS OF COTTON LEAVES AND THE EFFECT ON THEIR COMPOSITION OF WATER AND NUTRITIONAL STRESS (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre d'Adiopodoume.
J. Brzozowska, P. Hanower, and J. Tanguy.
Phytochemistry (Oxf). Vol 12, No 10, p 2353-2357. 1973. (English summary).

Descriptors: *Cotton, *Phenols, *Plant pathology.
Identifiers: Gossypium-anomalum, Gossypium-thurberi.

A range of phenolic compounds were found in leaves of 3 cottom species (Gossypium anomalum, G. thurberi and a cultivated hybrid). Water and nutrient stress (S deficiency) both caused a significant decrease in phenolic content. Possible interpretations of the observed phenomena are given.--Copyright 1974, Biological Abstracts, Inc.
W74-13344

GUIDELINES FOR RESEARCH ON WATER REQUIREMENTS OF CROPS,
Institute for Applied Research on Natural Resources, Bagdad (Iraq).
J. W. Kijne.
Technical Bulletin 59, April, 1974. 25 p, 4 fig, 17 ref, 3 append.

Descriptors: *Consumptive use, *Irrigation water, *Soil-water-plant relationships, *Water requirements, Crops, Evapotranspiration, Institutions, Instrumentation, Research and development, Research equipment, Research facilities, Research priorities, Universities, Water resources, Water supply.
Identifiers: *Iraq, State Farms.

Since water in Iraq is a limited resource, much interest there now centers on the water requirements of crops. This report considers only irrigation water requirements and discusses the consumptive use of water by crops. Guidelines of recommended research programs for the State Farms and for the Institute for Applied Research on Natural Resources are presented, as is an interdisciplinary program for basic research on evapotranspiration at the major universities of Iraq. Combined effort of the different research units is required in a systematic approach to ascertain the water requirements of crops in Iraq, such research can be done within the present framework of institutions now in operation. Most of the instrumentation for such studies is available at these institutions. (Gloyd-Arizona)
W74-13345

FEASIBILITY STUDY FOR THE ESTABLISHMENT OF DALMAJ PILOT PROJECT,
Institute for Applied Research on Natural Resources, Bagdad (Iraq).
A. H. Al-Rawi, R. Van Aart, J. Dougrameji, G. Toma, and A. A. Al-Khafaji.
Technical Bulletin 61, May, 1974. 152 p, 38 fig, 15 tab, 25 ref.

Descriptors: *Demonstration farms, *Irrigation programs, *Soil investigations, Arid climates, Hydrology, Irrigated land, Irrigation water, Land reclamation, Topography, Costs, Drainage engineering, Irrigation practices, Irrigation systems, Research and development, Soils, Surveys, Water requirement, *Feasibility studies.
Identifiers: *Dalmaj Pilot Project, *Iraq, Massaq region, Soil reclamation, State Farms.

An 80 ha pilot research and demonstration project was established within a State Farm to study soil reclamation and subsequent use of the reclaimed soils for irrigated farming. The 1000 ha State Farm, located along the northern part of the Massaq Main Canal in the Dalmaj Irrigation Project, was surveyed in detail with the expectation that research results could then be applied to other areas of similar environmental conditions. Accordingly, hydrological, topographical, and soil data for both the State Farm and the pilot area are presented, field irrigation and drainage systems are proposed, and research studies in water requirements and improvements in irrigation and drainage practices are recommended. Construction costs for the establishment and operation of the pilot demonstration project are included. (Gloyd-Arizona)
W74-13346

ON APPLICATION EFFICIENCY AND EFFECTS OF TRICKLE IRRIGATION IN A SAND DUNE FIELD (IN JAPANESE),
Tottoir Univ. (Japan). Sand Dune Research Inst.
T. CHO, and T. Yamamoto.
Bulletin No 12, p 20-28, March, 1973. 5 fig, 5 tab, 5 ref. (English summary).

Descriptors: *Arid lands, *Crop production, *Dune sands, Field crops, *Irrigation practices, Irrigation systems, Root zone, Soil moisture, Greenhouses, Lysimeters, Sprinkler irrigation, Testing.
Identifiers: *Trickle irrigation, Sand dunes.

In arid agricultural regions characterized by low water resources and high evaporation rates trickle irrigation has many advantages since high irrigation efficiency is essential. Experiments testing trickle irrigation application efficiency were conducted using small lysimeters in open fields and in a plastic greenhouse. Compared with sprinkler irrigation, trickle irrigation was found to (1) hold the soil moisture content in the root zone of all crops higher than field capacity - 7.4% by volume - during the day, (2) afford an application efficiency of 9 - 39% higher, (3) give crops yields 19 - 25% higher in the open fields and 14 - 68% higher in the plastic greenhouse. (Gloyd-Arizona)
W74-13348

ON THE HYDRAULICS OF THE NOZZLE ON TRICKLE IRRIGATION SYSTEM (IN JAPANESE),
Tottori Univ. (Japan). Sand Dune Research Inst.
T. Cho, T. Yamamoto, and S. Watanabe.
Bulletin No 12, p 13-19, March, 1973. 11 fig, 2 tab, 6 ref. (English summary).

Descriptors: *Hydraulic design, *Discharge(Water), *Irrigation systems, *Nozzles, *Root zone, Water pressure, Crops, Industrial production, Laminar flow, Rational formula, Testing.
Identifiers: *Trickle irrigation, White's empirical formula.

Trickle irrigation, developed in recent years in such arid agricultural areas as Australia, Israel, and the United States, features water under pressure distributed by a series of nozzles near the crop root zone. Here pressure is dissipated, and water drips out at a relatively slow rate. Nozzles, made of polyethylene materials, were trial-manufactured, and hydraulic experiments to demonstrate the effectiveness of the various sizes were conducted. Relationships between pressure and discharge rates of the nozzles were determined by making use of White's empirical formula for the friction factor of laminar flow in curved pipes. It is felt that these determinations can be applied in the design and manufacture of such nozzles for practical use. (Gloyd-Arizona)
W74-13349

ANNUAL REPORT ON GROUND WATER IN ARIZONA, SPRING 1972 TO SPRING 1973,
Geological Survey, Phoenix, Ariz.
For primary bibliographic entry see Field 4B.
W74-13350

EFFECT OF FERTILIZATION AND MULCHING WITH BIO-DEGRADEABLE POLYETHYLENE-COATED PAPER ON RESPONSES OF OKRA AND PEPPERS,
Florida Univ., Dover. Agricultural Research Center.
E. E. Albregts, and C. M. Howard.
Hortscience, Vol 8, No 1, p 36-38, 1973.
Identifiers: Capsicum, Ethylene, *Fertilization, Hibiscus, *Mulching, *Okra, *Peppers, Yield, Biodegradation.

Okra (Hibiscus esculentus L. cv. 'Clemson Spineless') and sweet pepper (Capsicum annuum L. cv. 'Yolo Wonger L') were grown at 2 fertility levels with treatments of full bed mulch, strip mulch and bare soil. A black paper coated on both sides with a thin layer of clear polyethylene was used as mulch. Germination okra and the early growth and seasonal marketable yield of both vegetables were greatest with the full bed mulch treatment. The strip mulch treatments increased yield of pepper over that of the unmulched but had little effect on okra yield. Yields were always higher with the higher fertility level, but differences were usually not significant. Pepper fruit size and numbers and okra pods per plant were increased by mulch treatment. As amount of bed covered by mulch increased so did the soil NO3 and K. Higher fertilizer rates generally increased soil NO3 and K but differences were significant only in 1972.--Copyright 1973, Biological Abstracts, Inc.
W74-13370

MERIT, RED ROCK AND POTOMAC: TOMATO VARIETIES ADAPTED TO MECHANICAL HARVESTING,
Agricultural Research Service, Beltsville, Md. Plant Science Research Div.
A. K. Stoner.
U S Dep Agric Prod Res Rep. 144 p 1-4. 1972. Illus.
Identifiers: Fusarium, Lycopersicon, Resistance, Stemphylium, *Tomatoes, Verticillium, Yield, *Mechanical harvesting.

Three mechanically harvestable tomato (Lycopersicon esculentum Mill) Cultivars-'Merit, 'Red Rock' and 'Potomac'-adapted to tomato-producing areas of eastern USA were released. The cultivars yielded over 20 tons of usable fruits/acre in single pickings. The fruits possess good qualities for processing. They are resistant to race 1 of Fusarium wilt, Verticillium wilt and fruit cracking. 'Red Rock' and 'Potomac' are resistant to Stemphylium solani Weber.--Copyright 1973, Biological Abstracts, Inc.

W74-13371

PROLONGED AFTERGLOW OF STRAWBERRY LEAVES AT VARIOUS LEVELS OF HYDRATION, (IN RUSSIAN),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
For primary bibliographic entry see Field 2I.
W74-13378

ELABORATION OF OPTIMAL DOSES AND FORMS OF MACRO- AND MICROELEMENTS AND HUMATES IN THE NUTRIENT USED IN HYDROPONIC CULTURE'WROCLAW,'
Wroclaw Univ. (Poland). Inst. of Botany and Biochemistry.
Z. Guminska, and M. Gracz-Nalepka.
Acta Agrobot, Vol 25, No 2, p 89-116, 1972. English summary.
Identifiers: Boron, Calcium, Copper, *Humates, Hydroponic, Molybdenum, *Tomatoes, Wroclaw, *Trace elements, *Hydroponics.

The effectiveness of macro- and microelements of modified Hampe solutions was investigated using tomato plants. In general, the original doses and forms of ions were optimal. Nevertheless, a pronounced dependence on external factors was found. In autumn, changes of Mg doses were of no importance. A double Ca dose was optimal at that time. During summer, Cu, B and Mo gave better effects if applied in 10-fold doses. Applying of humate in non-optimal conditions was distinctly advantageous.--Copyright 1973, Biological Abstracts, Inc.
W74-13380

CONTRIBUTIONS TO THE WATER RELATIONS OF OLIVE UNDER SEMI-ARID CONDITIONS,
Ain Shams Univ., Cairo (Egypt). Dept. of Botany.
For primary bibliographic entry see Field 2D.
W74-13382

STUDY OF GROWTH DYNAMICS OF 1-YR SHOOTS OF SEVERAL GRAPE VARIETIES UNDER IRRIGATED AND DRY CONDITIONS IN THE PIEDMONT ZONE OF THE NAGORNO-KARABAKH AUTONOMOUS REGION, (IN AZERBAIJANIAN),
S. G. Magerramov.
Dokl Akad Nauk Az SSSR. 9-10. p 66-69. 1972. Russian summary.
Identifiers: *Grape, Irrigation, *USSR(Karabakh region).

Shoot growth of the cultivars 'Bayan-shirei,' 'Rkatsiteli' and 'Tavriz,' a table grape, proceeded more intensely and for a longer period of time under irrigated than under unirrigated conditions. 'Rkatsiteli' grapes had longer shoots under unirrigated conditions than the other varieties. A study of growth dynamics is significant for the study of biological characteristics and hybridization of grapes.--Copyright 1973, Biological Abstracts, Inc.
W74-13394

GROWTH OF CROP ROOTS IN RELATION TO SOIL MOISTURE EXTRACTION,
Brooms' Barn Experiment Station, Bury St. Edmonds, (England).
M. J. Durrant, B. J. G. Love, A. B. Messem, and A. P. Draycott.
Ann Appl Biol. Vol 74, No 3, p 387-394, 1973. Illus.

Descriptors: *Soil moisture, Moisture availability, Crops, *Crop response, Field crops, Sugar beets, Potatoes, Vegetable crops, Barley, Cereal crops, Crop production.

Growth of the roots of sugar beet, potato and barley in the field was observed through glass panels and related to changes in soil moisture measured by a neutron probe during 1969-71. The depth of observed root growth was generally related to, but 10-15 cm deeper than, the maximum depth of soil-moisture extraction. On average of 3 yr, sugar beet, potato and barley used water from the top 23, 33 and 45 cm soil respectively by the beginning of June and from the top 70, 68 and >100 cm soil by the end of June. Maximum soil drying in each horizon gave an in situ measure of available water capacity and showed that sugar beet and barley eventually extracted similar amounts of water from each horizon, but potatoes estracted less, especially from below 60 cm. Between 30-100 cm deep, the in situ available water capacity (per 10 cm soil) progressively decreased from 16 to 10, 15 to 5 and 16 to 8 mm under sugar beet, potato and barley respectively. The calculated soil-moisture deficit (potential evapotranspiration minus rainfall) and measured soil moisture deficit were not related early in the growing period before the crops established mush leaf cover.--Copyright 1974, Biological Abstracts, Inc.
W74-13414

POTENTIAL PASTURE PRODUCTION IN THE UPLANDS OF WALES: I. CLIMATIC VARIATION,
Welsh Plant Breeding Station. Agricultural Research Council, Aberystwyth(Wales).
J. M. M. Munro.
J Br Grassl Soc, Vol 28, No 2, p 59-67, 1973, Illus.

Descriptors: *Pastures, Grasslands, Rainfall.
Identifiers: *Wales.

A comprehensive study of the climatic, soil and vegetation restraints on grassland production in the hill areas of Britain is an essential preliminary stage in land use planning for those areas. Climatic data, recorded continuously at 4 centers in mid-Wales (United Kingdom), emphasize the extent of altitudinal, topographic, seasonal and diurnal variation in zones with improvement potential. Annual solar energy income is negatively correlated with rainfall and cloud cover. Under wet conditions in the western hills, mean daily solar radiation during 1966-69 decreased by 15% between 2 centers at 30 and 305 m (103 and 1100 ft) O.D. from 9.92 MJ(megajoule)/sq m to 7.07 MJ/sq m (204-169 cal/sq cm). Radiation receipts in the drier eastern uplands at 305 m (1000 ft) were as high between May and Aug. as in the western lowlands, but winter temperatures were considerably lower. Comparisons are made with conditions in other upland areas of Britain.--Copyright 1974, Biological Abstracts, Inc.
W74-13454

EFFECT OF STRAW AS A FERTILIZER ON RICE YIELD, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
V. R. Rao.
Izv Akad Nauk SSSR Ser Biol. 3, p 420-422, 1973. English summary.

Descriptors: *Rice, *Mulching, *Fertilizers.
Identifiers: *Straw.

Application of rice straw increased crop yield of rice, especially when the straw was applied in the upper (0-6 cm) layer of soil. An increase of 30% yield was observed. In greenhouse studies straw was applied at 2 doses representing 5-10 tons/ha. Nitrogenous fertilizers significantly increased the yield of rice. However, with the combined application of straw and mineral fertilizers in the upper layer of soil additional response in the rice yield was recorded (about 40-50%). The beneficial effect of straw as a fertilizer is presumably due to the supplementry N accumulation by N fixers, which utilize the decomposition products of cellulose. Under water-logged conditions the decomposition of cellulose is manifested by both aerobic and anaerobic microorganisms.--Copyright 1974, Biological Abstracts, Inc.
W74-13455

PHOTOSYNTHESIS, DIFFUSION RESISTANCE AND RELATIVE PLANT WATER CONTENT OF COTTON AS INFLUENCED BY INDUCED WATER STRESS,
Agricultural Research Service, Mandan, N. Dak. Northern Great Plains Research Center.
D. G. Harris.
Crop Sci. Vol 13, No 5, p 570-572, 1973. Illus.

Descriptors: *Photosynthesis, *Transpiration, *Moisture stress, *Cotton.

Frequent and simultaneous measurements of photosynthesis, transpiration and relative plant water content were made on large cotton (Gossypium hirsutum L. 'Empire') plants. Measurements were made after adding polyethylene glycol to the nutrient solution to induce plant water stress. Reducing the solution water potential by 0.5, 1.0 and 2.0 bars had no observable effect upon the plant. The 4.0-bar treatment reduced photosynthesis, transpiration and relative plant water content of a 97-day-old plant. The effect of the 4.0-bar treatment diminished as plant maturity increased and no residual effect of the treatment was detected after 48 hr of recovery in a standard nutrient solution.--Copyright 1974, Biological Abstracts, Inc.
W74-13457

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

MICHIGAN'S EXPERIENCE WITH UTILIZING THE TEN STATES GUIDELINE FOR LAND DISPOSAL OF WASTEWATER,
Michigan Dept. of Public Health, Lansing. Div. of Wastewater.
For primary bibliographic entry see Field 5D.
W74-12898

FOREST SERVICE POLICY RELATED TO THE USE OF NATIONAL FOREST LANDS FOR DISPOSAL OF WASTEWATER AND SLUDGE,
Forest Service (USDA), Washington, D.C. Div. of Watershed Management.
For primary bibliographic entry see Field 5D.
W74-12899

FORECASTING DISCHARGE FROM A GLACIATED BASIN IN THE SWISS ALPS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 2C.
W74-12974

SURFACE WATER RESOURCES OF THE USSR AND THEIR CHANGE UNDER THE EFFECT OF INDUSTRIAL AND AGRICULTURAL ACTIVITY,
K. P. Voskresenskiy, A. A. Sokolov, and I. A. Shiklomanov.
Soviet Hydrology, Selected Papers No 2, p 123-142, 1973. 14 tab, 22 ref. Translated from Water Resources (Vodnyye resursy), No 2, p 33-57, 1973.

Descriptors: *Water resources, *Surface water availability, *Hydrologic data, *Water utilization, *Water supply, Hydrologic aspects, Hydrology, Industrial water, Lakes, Reservoirs, Glaciers, Runoff, Irrigation water, Domestic water.
Identifiers: *USSR.

The water resources of the Soviet Union comprise river runoff, waters accumulated in lakes and reservoirs, glaciers, snow cover and ground-

waters. The surface water resources of the USSR amount to about 42,000 cu m and the surface runoff amounts to 4714 cu m in an average year. The locations and distributions of surface water resources are discussed as well as their changes resulting from industrial and agricultural activity. The surface water resources will not undergo significant changes in the next 20-30 years, and their possible decrease will be insignificant. The effect of industrial activity will be stronger in the future in individual regions and river basins of the arid zone. The runoff of the northern rivers of the European USSR and of Siberian rivers will have to be diverted to the south in the next 20-30 years for the further development of industrial activity in these regions. (Humphreys-ISWS)
W74-12983

PROBABILITY DISTRIBUTION OF OUTFLOW FROM A LINEAR RESERVOIR,
Department of the Environment, Ottawa (Ontario). Hydrology Research Div.
V. Klemes.
Journal of Hydrology, Vol 21, No 4, p 305-314, 1974. 1 fig, 5 ref.

Descriptors: *Hydrologic systems, *Reservoir storage, *Stochastic processes, Probability, Markov processes.
Identifiers: Probability distribution, Random numbers, *Linear reservoirs.

The probability distribution of output from a linear reservoir was derived for a random and a first-order Markovian input. In the first case it was expressed in terms of the input distribution; in the second case, in terms of the distribution of its random component. The analytical solutions showed how a particular deterministic system transforms a particular stochastic input thereby contributing to system identification. (Terstriep-ISWS)
W74-13001

DETERMINISM AND STOCHASTICITY IN HYDROLOGY,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-13010

QUASI-BIENNIAL STREAMFLOW VARIATION IN THE USSR,
For primary bibliographic entry see Field 2A.
W74-13011

LINEAR DECISION RULE: A NOTE ON CONTROL VOLUME BEING CONSTANT,
Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
S. C. Nayak, and S. R. Arora.
Water Resources Research, Vol 10, No 4, p 637-642, August 1974. 1 fig, 1 ref.

Descriptors: *Reservoir releases, *Control, *Volume, *Storage capacity, *Management, *Linear programming, Reservoir storage, Floods, Droughts, Constraints, Equations, Decision making, Optimization, Systems analysis, Mathematical models.

Using the linear decision rule of Revelle et al. (see W69-09459) for the release management of reservoirs, the problem of finding an optimal reservoir storage capacity is considered; capacity requirements for flood and drought periods are dealt with. Studied in detail is the phenomenon of control volume, and the assumptions under which control volume stays constant are clarified. (Bell-Cornell)
W74-13019

DRAINAGE SYSTEM DESIGN AND ANALYSIS BY COMPUTER,
Soil Conservation Service, Portland, Oreg.
D. M. Renner, and C. C. Mueller.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR3, Proceedings paper No 10801, p 255-265, September 1974. 8 fig, 1 tab, 11 ref.

Descriptors: *Drainage systems, *Subsurface drainage, *Design, *Computer programs, *Equations, *Irrigated land, Tile drains, Water table, Costs, Depth, Hydraulic conductivity, Washington, Systems analysis.
Identifiers: *Transient flow method, Drain spacing, System layout, Sensitivity.

The conditions needed for the theoretical mathematical solution in the design of subsurface drainage systems are usually hard to find in the field. An optimum system design cannot be obtained without knowledge of the correct inputs to the drainage design equation. Two programs are presented for using the computer to design subsurface drainage systems for irrigated areas. The first calculates drain spacings using the Dumm, Moody, and Tapp nonsteady-state transient flow method, which provides close correlation between theory and practice. The second program provides drainage system layouts in an area requiring drainage for any specified drain spacing and drain depth. Using these two programs, all input parameters can be investigated and the effect of their variance on both drain spacing and system cost can be found. Thus, a sensitivity relationship between the drain spacing and system layout, and the parameters used in calculating the spacing, can be defined. (Bell-Cornell)
W74-13021

OPTIMIZED DESIGN OF A SUBSURFACE DRAINAGE SYSTEM,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
E. H. Wiser, R. C. Ward, and D. A. Link.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 17, No 1, p 175-182, February 1974. 3 fig, 1 tab, 15 ref.

Descriptors: *Subsurface drainage, *Drainage systems, *Tile drainage, *Design, *Simulation analysis, *Crop response, *Water table, *Water balance, Optimization, Depth, Economics, Benefits, Costs, Methodology, Research, Damages, Hydrologic data, Flooding, Rainfall, Information, Model studies, Systems analysis.
Identifiers: Spacing, Assumptions.

Described is a technique for evaluating optimum values of depth and spacing for a uniform subsurface drainage system. The objective is to maximize the amount by which system benefits exceed costs. System benefits are classed as increased yield and quality of crops, and improved working conditions. System costs consist of the fixed cost of the system itself and the annual maintenance and crop production costs. Using the technique, a subsurface drainage system was designed for a silt loam soil to be grown to alfalfa in central North Carolina. Described is a model for pulse inputs of rainfall for simulating water table fluctuation, using available climatological data. Also described are a water balance model and a model for the effect on plant growth. Consideration is given to sources of error in the assumptions and to alternative models that would lead to more reliable results. It is shown that a single optimum design can be obtained. If some depth variation is necessary, spacing can be modified to obtain net returns near the optimum. (Bell-Cornell)
W74-13025

SOME PROBLEMS ON THE STOCHASTIC FLOOD CONTROL,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
Y. A. Rozanov.
Report 74-13, June 1974. 6 p, 1 ref.

Descriptors: *Flood control, *Probability, *Reservoirs, *Storage capacity, *Flow, Stochastic processes, Equations, Water transfer, Constraints, Inflow, Control, Optimization, Markov processes, Hydrologic aspects, Systems analysis, Mathematical models.

A system of reservoirs is connected in such a way that an amount of water can be transferred from one reservoir to another during a specified time period and to the outside where control parameters limit the maximum or minimum allowable flow. Considered is the problem of accumulating water during some time period and choosing the optimal control parameter which will minimize the mean square expected value of deviations from target storage volumes. (Bell-Cornell)
W74-13029

A STUDY OF HOW WATER QUALITY FACTORS CAN BE INCORPORATED INTO WATER SUPPLY ANALYSIS,
Ernst and Ernst, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-13030

ANALYSIS OF URBAN LAND TREATMENT MEASURES FOR FLOOD PEAK REDUCTION,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
A. M. Lumb, J. R. Wallace, and L. D. James.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 418 $5.75 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No ERC-0574, June 1974. 146 p, 33 fig, 17 tab, 35 ref, 3 append. OWRT C-2064(3359)(3).

Descriptors: *Urban hydrology, *Storm runoff, Land use, Floods, *Flood routing, *Computer models, *Land management, Storage, Channels, Terracing, Landscaping, Grassed waterways, Model studies, Watershed management, Drainage, Urban runoff.
Identifiers: Watershed models, Flood models.

Two computer models for urban hydrologic studies were developed. The Small Urban Watershed Flood Hydrograph Model is to study how flood hydrographs are affected by the arrangement of buildings and paved areas on small watersheds. Storm runoff is simulated from the physical characteristics of (1) small homogeneous land areas averaging about one quarter acre in size and (2) channel sections. The Urban Hydrograph Routing Model is to study how flood hydrographs are affected by the distribution of land uses in larger watersheds, changes in impervious area, and channel characteristics. Applications of these models showed that (1) small detention storage basins are effective in holding runoff from newly developed areas to their former peaks under natural conditions but become progressively less effective with increasing watershed size, (2) using natural instead of paved collector channels has a similar pattern of substantially reducing head-water hydrographs but diminishing effectiveness as one goes downstream, (3) draining roofs and driveways onto dense turf is effective immediately downstream and, because of volume reductions, may cumulatively have a greater effect in larger watersheds, (4) terracing is effective if dense turf is maintained but bare dirt terraces probably do not justify their costs, and (5) commercial and industrial areas accentuate flood hydrographs most when located near the middle of a watershed.
W74-13043

DECISION MAKING UNDER UNCERTAINTY: ECONOMIC EVALUATION OF STREAMFLOW FORECASTS,
Michigan Univ., Ann Arbor. School of Natural Resources.
G. Schramm, R. W. Fenton, J. L. Moore, D. Hughart, and G. R. Moore.

Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 417 $10.50 in paper copy, $2.25 in microfiche. Completion Report, July, 1974, 422 p, 29 fig, 64 tab, 89 ref. OWRT C-1140(1588)(3).

Descriptors: *Streamflow forecasting, *Economic prediction, *Risks, *Decision making, *Estimated benefits, *Idaho, *Wyoming, Snowmelt, Irrigation, Model studies, *Reservoir operation, Economic efficiency, Computer models, Project benefits.
Identifiers: Snake River(Ida-Wyo), Palisades-Jackson Reservoir(Ida-Wyo), *Forecasting errors.

The research focuses on the potential economic benefits that could accrue to different classes of water users as a result of improvements in the accuracy of streamflow forecasts. Detailed efforts for the evaluation of the economic benefits from improved streamflow forecast accuracy were concentrated on water use activities that depend substantially on snowmelt runoff. The first part of the study qualifies the approximate benefits to a typical western U.S. irrigation area from improved seasonal streamflow forecasts through the use of a probabilistic linear programming model. This model serves to allocate a region's crop acreages, so as to maximize the expected income of planting associated with each forecast. Results from testing the model indicate gross benefits ranging from a few cents per acre up to $6.00 per acre. The second part of the study analyzes the effect that more accurate forecasting would have on the efficiency of multiple purpose water reservoirs. An investigation was made of the causal relationship between errors in streamflow and water supply forecasts and any resulting inefficient reservoir operation. To estimate the benefit of avoiding these inefficiencies through improvements in streamflow forecasting, a computer simulation model was developed. The model represents a first attempt to combine a hydrologic forecasting routine capable of generating forecasts of varying degrees of accuracy with a reservoir operating model reflecting the objectives of the operator and the constituents of the water service area, and the social and political constraints. The model allocates joint-use storage space in the reservoir on the basis of a Flood Control Reservation Diagram and daily forecasts of remaining season runoff and daily streamflow over the next thirty day period. This operations model is based on the Palisades-Jackson Reservoir complex on the Snake River in Idaho and Wyoming. The results indicate that significant benefits may be derived from improved seasonal water supply forecasts if the economic values in the water service area are significant. Additional major benefits of forecasting improvements are likely to arise in situations where the operating procedures of existing reservoirs are revised by reducing flood storage requirements in line with reductions in likely forecast errors.
W74-13044

RESERVOIR PROJECT REAUTHORIZATION: EXAMPLES OF PAST USE AND ANALYSIS OF APPLICATION TO LAKE LANIER,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
C. R. Holley, and E. P. Kane.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 408 $6.25 in paper copy $2.25 in microfiche. ERC-0374, August 1974. 161 p, 3 fig, 12 tab, 80 ref.

Descriptors: Water supply, Power operation and maintenance, *Reservoir operation, Flood control, Electric power, *Water allocation(Policy), Recreation, *Institutional constraints, Financial feasibility, *Georgia, Legislation, State governments, Municipal water.
Identifiers: *Congressional reauthorization, *Lake Lanier(Geo), Atlanta(Geo).

Congressional reauthorization is required if it is desired after a large reservoir is constructed to change the operating rules to shift use of the facility among the various possible purposes. As demands for water continue to increase, as fewer economical reservoir sites remain, and as reservoir construction becomes increasingly restricted by environmental and social considerations, more and more attention will have to be placed on revising the use of existing as opposed to building new facilities. The first part of this report described historical cases of Congressional reauthorization. Seven situations in which reservoirs went through the reauthorization process and nine cases to be studied under Public Law 91-611 are outlined. Reallocation of storage space from flood control to water supply has been the most common change. The second part of this report appraises the situation in which metropolitan Atlanta, Georgia, needs additional water and Lake Lanier is now used for other purposes but appears to be one of the more attractive alternatives. Effects of the change on recreation benefits and on institutional and financial arrangements are discussed. The evaluation found that conversion of the current storage allocation from hydroelectric power to municipal water supply seems to be the most promising alternative and can probably be accomplished at minimal sacrifice in flood control and recreation benefits. (James-Georgia Tech)
W74-13046

THE RELATIONSHIP OF LAND USE TO DOMESTIC SURFACE WATER SUPPLY IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
W. L. Nutter, and D. W. Shaw.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 429 $4.25 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No ERC-0873, June 1973. 53 p, 5 fig, 5 tab, 13 ref, 3 append. OWRT A-039-GA(1), 14-31-0001-3510.

Descriptors: Water resources, *Water supply, Water users, Water quality, *Watershed management, Water treatment, Watersheds(Basins), *Water utilization, *Domestic water, Land tenure, *Land use, *Surface water availability, *Georgia, Water treatment.
Identifiers: Piedmont Province, Blue Ridge Province, Valley Province, Fall-line.

A questionnaire and interview procedure was used to identify all the sources of surface water supply and land use related water quality problems in Georgia. One-hundred and six watersheds provide raw water to 97 treatment systems which in turn supply 154 communities and institutions with a population of 2.69 million. All the watersheds are north of the fall-line in the piedmont and mountain provinces of the state. Each watershed boundary and intake point are identified on a map. Approximately 23 percent of the watersheds are less than 5 square miles and 68 percent are less than 100 square miles in area. Forest logging, agricultural cropping and pasturing, and recreation related activities were the watershed uses most frequently cited as sources of water quality problems. No cases were cited of communities attempting to control upstream practices affecting water quality, although in a few cases where the abusive practice ceased, raw water treatment costs were reduced by one-third. No community in Georgia owns its entire watershed. Two communities have special use agreements with the U.S. Forest Service for water supply and 9 communities depend on land use measures and reservoirs of the P.L. 566 Small Watershed Program of the U.S. Soil Conservation Service.
W74-13047

MAN AND WATER, THE SOCIAL SCIENCES IN MANAGEMENT OF WATER RESOURCES.
Kentucky Univ., Lexington. Water Resources Inst.
For primary bibliographic entry see Field 6B.
W74-13058

ANTHROPOLOGICAL CONTRIBUTIONS TO THE CULTURAL ECOLOGY AND MANAGEMENT OF WATER RESOURCES,
Washington Univ., Saint Louis, Mo. Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 6B.
W74-13060

ROLE OF GEOGRAPHY IN WATER RESOURCES MANAGEMENT,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 6B.
W74-13062

THE IMPACT OF MAN-MADE LAKES ON RESIDENTIAL PROPERTY VALUES: A CASE STUDY AND METHODOLOGICAL EXPLORATION,
Toronto Univ. (Ontario), Dept. of Geography.
For primary bibliographic entry see Field 6B.
W74-13066

SPECIAL FLOOD HAZARD INFORMATION REPORT: DRY CREEK, DOUGHERTY COUNTY, GEORGIA.
Army Engineer District, Mobile, Ala.
Prepared for Dougherty County, August 1971, 10 p, 2 fig, 1 tab, 4 plates.

Descriptors: *Floods, Flooding, Floodplains, *Flood control, Flood protection, *Georgia, Sinks.
Identifiers: *Dry Creek(Ga.), Dougherty County(Ga).

Dry Creek, located 8 miles south of Albany, Georgia, flows through mostly agricultural land. Its basin, draining a total of 68 square miles in 3 counties, is flat in the lower reaches becoming hilly in the headwaters. Numerous limestone sinkholes and depressions are located throughout the basin making the channel hard to find in periods of low flood. Banks of both Dry Creek and the South Fork of Dry Creek are low, channel widths are about 30 feet in lower reaches and the streams slope about 9 feet per mile allowing wide areas of the floodplain to be covered when flooding occurs. Six bridges span the creek. Flood producing storms occur during winter and spring; however, thunderstorms may cause localized flooding at any time. Damage to crops and roads has occurred due to past flooding. No floodplain management program has been proposed, although the potential for increased residential and industrial development in Dougherty County indicates there will be a greater demand for building sites in the floodplain, and a program of flood damage reduction is highly desirable. Because of sinkholes and depressions which result in local ponding not attributed to stream overflow, it is suggested that local foundation conditions should be determined before building load bearing structures in the basin. Preparation of maps showing potential flooded areas was not considered practical. However, by using plates showing contour elevations for the reaches of Dry Creek plus high water profiles, the approximate depth of flooding along the creek by the 50 and 100 year flood can be determined. (Salzman-North Carolina)
W74-13067

FLOOD PLAIN INFORMATION: SOPE CREEK, VICINITY OF MARIETTA, GEORGIA.
Army Engineer District, Mobile, Ala.
Prepared for the Atlanta Region Metropolitan Planning Commission, March, 1973. 16 p, 4 fig, 7 tab, 8 plates.

Descriptors: *Floods, *Flooding, *Floodplains, *Floodplain zoning, Flood control, Flood protection, *Georgia.
Identifiers: *Sope Creek(Ga), Marietta(Ga), Cobb County(Ga).

Sope Creek, a tributary of Chattachoochee River, which slopes at an average of 26.8 feet per mile, has a channel width ranging from 15 to 50 feet and has banks 3 to 15 feet high, flows through Marietta, the county seat of Cobb County located northwest of Atlanta. Varying in width from 200 to 500 feet, the floodplain ranges from being moderately developed in the city of Marietta, to relatively undeveloped in outlying areas. Generally the Creek flows along the edge of residential subdivisions. Gage records, newspaper files and interviews provided data. Frontal type storms during the winter and spring cause most of the floods lasting 2 to 4 days. Summer thunderstorms cause high intensity flooding over small areas. Both natural and man-made obstructions including 18 bridges and their approach embankments impede flood flows. No flood control measures exist. Cobb County zoning ordinances state that no structure shall be located in areas subject to flood damage; however, it is being revised. Only limited information concerning past floods is available possibly due to sparse development in the floodplain. Floods of 1971 and 1972 caused damage to homes and property. Intense combinations of rainfall and run-off could create an Intermediate Regional Flood with a peak discharge of 10,690 cubic feet per second (cfs) at Sope Regional Flood with a peak discharge of 10,690 cubic feet per second (cfs) at Sope Creek's mouth and a Standard Project Flood of 22,910 cfs. Hazardous conditions would exist on the floodplain resulting in property damage as well as flooding of sanitary sewer lines and sewage treatment facilities. (Salzman-North Carolina)
W74-13068

FLOOD PLAIN INFORMATION, LITTLE NESHAMINY CREEK, BUCKS COUNTY, PENNSYLVANIA.
Army Engineer District, Philadelphia, Pa.
Prepared for the Bucks County Planning Commission, November, 1973. 25 p, 5 fig, 7 tab, 10 plates.

Descriptors: *Flooding, *Floodplains, *Flood control, Flood damage, Historic floods, Dams, *Pennsylvania.
Identifiers: *Little Neshaminy Creek(Pa), Bucks County(Pa).

The floodplain covers an area from Richland, Pennsylvania where little Neshaminy Creek merges with Neshaminy Creek to the Bucks-Montgomery County Line. The watershed area of 43 square miles is primarily agricultural land but the expansion of Philadelphia pressures the development of the floodplain with commercial and residential properties. The stream has low banks and numerous natural obstructions. Floods occur in all seasons caused by snowmelt in the winter and heavy hurricane-caused rains which increase summer run-off. A small dam on the Creek has no flood control capacity. Two proposed Soil Conservation Service dams could reduce the Intermediate Regional Flood (IRF) by 50%. Two small communities within the floodplain, Warrington Township and Northampton Township, have floodplain zoning ordinances. In some areas the stream alignment has been straightened and the channel widened. The greatest flood occurred August 19, 1955 cresting at 63.4 feet, mean sea level. The most recent flood occurred November 9, 1972 cresting at 55.6 feet, and resulted in property damage to roads and homes. An IRF, cresting at 153.6 feet would inundate the entire floodplain causing hazardous conditions. A Standard Project Flood (SPF) would have nearly twice as much discharge as an IRF, with greater water velocity, thereby affecting a greater portion of development. This report furnishes a basis for the adoption of land use controls to guide floodplain management. (Salzman-North Carolina)
W74-13069

SPECIAL FLOOD HAZARD INFORMATION REPORT, CHATTAHOOCHEE RIVER, ROARING BRANCH, WERACOBA CREEK AND LOWER BULL CREEK, VICINITY OF COLUMBUS, GEORGIA.
Army Engineer District, Mobile, Ala.
Prepared for Lower Chattachoochee Valley Area Planning and Development Commission, August, 1971. 11 p, 1 tab, 12 plates.

Descriptors: *Floods, *Flooding, *Flood control, *Georgia, Floodplains, Dams, Flood protection, Historic floods, *Alabama.
Identifiers: Columbus(Ga), Phenix City(Ala), *Chattahoochee River(Ga), Roaring Branch(Ga), Weracoba Creek(Ga), Lower Bull Creek(Ga).

Chattahoochee River flows through Columbus, Georgia and its neighboring city across the river, Phenix City, Alabama. Weracoba Creek, formed north of Columbus, flows into Bull Creek which flows into Chattahoochee River. Roaring Branch flows for four miles through hilly undeveloped terrain with a slope of 40 feet per mile before entering into Chattahoochee River. Bull Creek, a larger stream, has a moderately developed floodplain. Weracoba Creek, running through highly urbanized areas of Columbus, is contained within several culvert systems as well as being crossed by roads. Because of these developments the natural channel is non-existent and flow is controlled by man-made structures. Under these conditions, widespread shallow flooding occurs throughout the drainage basin. The width of the Chattahoochee River in vicinity of Columbus is 400 to 600 feet with banks 20 feet high. The average slope of the river is 10 feet per mile. West Point Dam, 37 miles upstream from Columbus reduces flood stages. Flood producing frontal type storms generally occur from December to April taking several days and cover large areas. Summer storms are of shorter duration but higher intensity over smaller areas. Flooding of lowlands south of Columbus occurs twice annually. The highest flood occurred on March 1929 cresting at 328 mean sea level. The most recent flood was on March 1966. An Intermediate Regional Flood (IRF) would meet the level of the March 1929 flood, and a Standard Project Flood (SPF) would be 6 feet higher. Both would cause damage to development in the floodplain. No flood plain zoning regulations exist. (Salzman-North Carolina)
W74-13070

APPLICATION OF REMOTE SENSING TO STATE AND LOCAL GOVERNMENT (ARSIG),
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 6F.
W74-13140

APPLICATION OF REMOTE SENSING TECHNIQUES IN LAND USE PLANNING: FLOODPLAIN DELINEATION,
Cochise County Planning Dept., Ariz.
R. B. Clark, and J. Altenstadter.
Office of Arid Land Studies, University of Arizona, Tucson, Arizona, OALS Bulletin 6, July 1974. 22 p. 6 fig, 2 tab, 6 ref. NASA Grant NGL 03-002-313.

Descriptors: *Flood plain zoning, *Land use, *Remote sensing, *Project planning, Flood data, Soils, Soil stability, Vegetation, Arid lands, Regional development, Hydrologic data, Geomorphology, Watersheds(Basins), Maps, *Arizona.
Identifiers: Earth Resources Technology Satellite(ERTS-1), Cochise County(Ariz).

A floodplain delineation project was conducted by the Cochise County Planning Department in southern Arizona in response to legislation passed in Arizona in 1973, requiring local governments to outline 100-year floodplains in areas of current land development and to construct ordinances for land use management in these areas. The project employed imagery from the Earth Resources Technology Satellite (ERTS-1) and high altitude aircraft to determine areas of potential flooding. Results of this project were a set of base map overlays delineating areas requiring special regulation, together with county-wide maps of watershed configurations and soil hydrology groups. Data from this project and subsequent projects will be presented to the County Board of Supervisors for use in development of subdivision regulation ordinances. (Mastic-Arizona)
W74-13142

INTERRELATIONSHIPS BETWEEN QUANTITATIVE GEOMORPHIC CHARACTERISTICS OF THE DRAINAGE BASINS IN SUB-HUMID TO HUMID ENVIRONMENT OF RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
S. Singh, and B. Ghose.
Annals of Arid Zone, Vol 12, No 1 and 2, p 82-99, March and June, 1973. 27 fig, 1 tab, 2 ref.

Descriptors: *Model studies, *Drainage systems, *Sediment yield, *Geomorphology, *Channel morphology, Small watersheds, Water yield, Watersheds(Basins), Streams, Hydrologic properties.
Identifiers: *India.

A study of 15 small agricultural drainage basins has shown that certain of their morphological characteristics are interrelated to basic hydrologic properties of the streams. From these relationships contributions can be made toward estimations of water and sediment yields. Results are not directly applicable to the arid and semi-arid parts of the country, because of variations in geologic formations and climatic conditions. This study has attempted to correlate the known morphometric characteristics to the humid and sub-humid environment where the study occurred, to help in appraisal and exploitation of water resources. The determination was made that basins with higher values of stream frequency and other factors are circular; the lower values are present in elongated basins. (Mastic-Arizona)
W74-13147

DRAINAGE AND LAND RECLAMATION IN THE LOWER MESOPOTANIAN PLAIN,
International Agricultural Centre, Wageningen (Netherlands).
R. Van Aart.
Nature and Resources, Vol 10, No 2, p 11-17, April-June, 1974. 3 fig, 1 tab.

Descriptors: *Drainage, *Saline water-freshwater interfaces, *Land reclamation, *Desalinization, *Saturated soils, Saline soils, Salt tolerance, Alkali soils, Crop response.
Identifiers: *Irag(Persian Gulf).

Presented are results of survey and research work to be used in developing methods for land reclamation and consequent development of soils in the Mesopotamian valley in Irag. Major problems include waterlogging and salinization of the land by intrusion of saline water from the Arabian Gulf due to high tides. Solutions consist of drainage by control and lowering of the groundwater table followed by desalinization and dealkalinization, and finally reclamation through adequate crop-growth by means of a change in cropping patterns of existing crops and introduction of new crops. (Mastic-Arizona)
W74-13148

ARIZONA'S WATER RESOURCES,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 6D.
W74-13152

TILIZATION OF DISUSED COAL MINES AS
ATER STORAGE RESERVOIRS,
eesside Polytechnic, Middlesbrough (England).
ept. of Civil Engineering.
or primary bibliographic entry see Field 4B.
74-13164

LOOD OF JUNE 1964 IN THE OLDMAN AND
ILK RIVER BASINS, ALBERTA,
epartment of the Environment, Ottawa, Ontario). Inland Waters Directorate.
or primary bibliographic entry see Field 2E.
74-13173

UANTITATIVE AND HISTORICAL
VIDENCE OF VEGETATION CHANGES
LONG THE UPPER GILA RIVER, ARIZONA,
eological Survey, Tucson, Ariz.
or primary bibliographic entry see Field 3B.
74-13174

YDROLOGIC ENGINEERING METHODS
OR WATER RESOURCES DEVELOPMENT:
OLUME 4. HYDROGRAPH ANALYSIS,
orps of Engineers, Davis, Calif. Hydrologic Engineering Center.
or primary bibliographic entry see Field 2E.
74-13177

LOODS OF JUNE 1972 IN THE HARRISBURG
REA, PENNSYLVANIA,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13186

LOOD OF MARCH 1968 ON THE NEPONSET
IVER, MASSACHUSETTS,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13187

LOODS IN CAPRON QUADRANGLE,
ORTHEASTERN ILLINOIS,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13188

LOODS IN GARDEN PRAIRIE QUADRANLE, NORTHEASTERN ILLINOIS,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13189

LOODS IN HARVARD QUADRANGLE,
ORTHEASTERN ILLINOIS,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13190

ATER RESOURCES OF THE MAUMEE
IVER BASIN, NORTHEASTERN INDIANA,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13191

LOOD OF MARCH 1968 ON THE IPSWICH
IVER, MASSACHUSETTS,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13194

LOOD SURVEYS ALONG TAPS ROUTE,
LASKA,
eological Survey, Anchorage, Alaska.
or primary bibliographic entry see Field 2E.
74-13198

FLOODS OF JUNE 1965 IN ARKANSAS RIVER BASIN, COLORADO, KANSAS, AND NEW MEXICO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 2E.
W74-13207

RED BOILING SPRINGS WATERSHED PROJECT, MACON AND CLAY COUNTIES, TENNESSEE, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
Available from National Technical Information Service, Springfield, Va 22161 as EIS-TN-73-1701-F, $4.25 paper copy, $2.25 microfiche. October 25, 1973. 58 p, 3 fig, 4 tab.

Descriptors: *Environmental effects, *Watershed management, *Tennessee, *Federal government, *Flood control, Floods, Flooding, Water management(Applied), Flood plains, Flood protection, Watersheds(Divides), Flood plain zoning, Nonstructural alternatives, Southeast US, Appalachian Mountain Region, Watershed Protection + Flood Prevention Act, Erosion control, Sediment control, Flood damage, Land management, Soil conservation, Conservation, Water policy, Water resources development.
Identifiers: *Environmental Impact Statements, Macon + Clay Counties(Tenn), *Dam effects.

This project is located in Macon and Clay Counties, Tennessee. The plan proposes conservation land management for 2,450 acres, construction of five floodwater retarding structures with measures to preserve the downstream fishery habitat, and flood plain zoning in low-lying areas. The flood plain comprises six percent of the watershed. Most of the watershed is forest or pastureland. Damaging floods occur in the agricultural areas two or three times a year. Floods large enough to damage residential or commercial properties occur about once every five years. The project will significantly reduce erosion and floodwater damage. Fifty-five acres of wildlife habitat will be permanently inundated, 107 acres will be needed for construction, and 78 acres will be temporarily flooded. Land management techniques, purchase of flood plain land, flood-proofing and flood plain zoning, and channel modification were deemed ineffective solutions to the flood problem. The proposed project is compatible with the present and long-term objectives of the sponsors. There is no significant opposition to this project. (Deckert-Florida)
W74-13223

ALPINE LAKE PROJECT ALPINE, TEXAS, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.
Available from National Technical Information Service, Springfield, Va 22161 as EIS-TX-73-1406-F, $3.75 paper copy, $2.25 microfiche. August 27, 1973. 41 p, 3 map.

Descriptors: *Environmental effects, *Dam construction, *Multiple-purpose projects, *Reservoir construction, *Texas, Southwest U.S., Reservoirs, Dams, Flood control, Flooding, Flood protection, Check structures, Diversion structures, Dikes, Water supply, Water management(Applied), Watershed management, Recreation, Water resource development, Recreation facilities, Flood routing, Water supply development, Federal government, Flash floods, Conservation.
Identifiers: *Environmental Impact Statements, *Alpine(Tex), Dam effects.

This project calls for construction of multi-purpose floodwater retarding structures to provide storage for a municipal and industrial water supply, recreation, and flood control. The improvements would be constructed immediately south of the city limits of Alpine, Texas, and would affect the Alpine, Paisano, and West Mores creeks. The region is semi-arid and subject to flash flooding during summer months. The project would reduce flooding and provide a small permanent pool for recreation and fishery enhancement. 784 acres of grazing land currently used as wildlife habitat by coyotes and jackrabbits would be lost due to inundation and changed land use. Channelization, detention structures, diversions, flood plain enlargement and combinations thereof, and no action were deemed inadequate alternatives. Other than the inundation of the 784 acres, no irreversible commitment of resources is required and the relationship between short-term uses and long-term productivity is highly favorable. Local, state and federal agencies support the project and there is no significant opposition. (Deckert-Florida)
W74-13224

TREXLER LAKE, JORDAN CREEK, PENNSYLVANIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.
Available from National Technical Information Service as EIS-PA-73-1430-F $6.25 paper copy, $2.25 microfiche. August 30, 1973. 174 p, 14 fig, 12 tab.

Descriptors: *Environmental effects, *Multiple-purpose reservoirs, *Dam construction, *Water supply, *Economic effects, Delaware River Basin Commission, Rivers, River basins, Reservoirs, *Pennsylvania, Flood protection, Water shortage, Recreational facilities, Wildlife habitat, Flood control, Dams, Reservoir operation, Reservoir yield, Flow control, Human population, Community development, Industries, Federal government, Administratiive agencies.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act, *Allantown(Pa).

The Trexler project proposes to construct a dam across the Jordan Creek creating a lake with a surface area of 1220 acres. It would be located on farmland in the Lehigh Valley just north of Allantown, Pennsylvania. The project would solve the problems of floods and water shortage, and would provide additional employment and recreational facilities. The area is rapidly populating and industrializing, which increases the demand for water. The project, which will alter the environment, will require relocation of roads, and telephone and power lines. Displaced wildlife are expected to emmigrate into a new range. Adverse effects include conversion of a free-flowing stream to slack water, loss of farmlands, decrease of taxable lands, elimination of a wildlife habitat, limitation of the Trexler Game Preserve, and modification of existing scenery. Alternatives including no action, location of a similar project elsewhere, construction of a series of small reservoir, and regulation of flood plain development were not chosen due to cost and lack of efficacy. The long-term productivity would provide public access to recreational opportunities, increased water supply, and reduced flood damage. No irreversible measures are proposed except labor, materials and excavation of the spillway. (Dillingham-Florida)
W74-13225

THIMBLE SHOAL CHANNEL (MAINTENANCE DREDGING) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Norfolk, Va.
Available from National Technical Information Service as EIS-VA-73-1471-F, $3.75 paper copy, $3.75 microfiche. September 7, 1973. 34 p, 2 tab, t map.

Descriptors: *Environmental effects, *Dredging, *Sediment control, *Chesapeake Bay, *Rivers and Harbors Act, Channel improvement, Spoil banks, Turbidity, Inlets(Waterways), Federal government, Aquatic environment, Water quality, Water

pollution effects, Benthic flora, Benthic fauna, Harbors, Inland waterways, Sediment-water interfaces, *Virginia.
Identifiers: *Environmental Impact Statements, Coastal waters, Coastal zone management, National Environmental Policy Act, Spoil disposal(Offshore).

This project was originally adopted by the Rivers and Harbors Act of 1910. It is located in the lower portion of the Chesapeake Bay Mouth. Maintenance dredging is required every 2-3 years to allow deep-draft commercial and military vessels continued access to the extensive port facilities located around the bay. Ecological damages are expected to be minimal. The original sediment-water interface, as well as deeper substrate material, has already been removed. Some benthic organisms will be lost during dredging and spoiling operations. Temporary turbidity caused by the dreding activity should have only minor effects in the areas of the channel and disposal site. Dredging operations will be conducted during local fish spawning and shellfish setting seasons. Disposal will take place the Dam Neck disposal area. Alternate disposal sites were considered, buy only Cape Henry, Virginia, was deemed to be feasible. This project will not alter the long-term productivity of the national environment and no opposition to the project has been expressed. (Deckert-Florida)
W74-13226

RESOLVING WATER RESOURCE RIDDLES,
Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
For primary bibliographic entry see Field 3F.
W74-13230

AGRICULTURAL DRAINAGE AND THE PUBLIC INTEREST, (PART I),
Minnesota Dept. of Natural Resources, St. Paul.
For primary bibliographic entry see Field 3F.
W74-13232

ECOLOGY OF UPPER CATCHMENT AREA OF RIVER NARMADA CLIMOVEGETATIONAL RELATIONSHIPS: I,
Saurashtra Univ., Rajkot (India). Dept. of Biosciences.
M. S. Murthy.
Jap J Ecol, Vol 21, No 5/6, p 188-192, 1971, Illus.
Identifiers: *Catchments, *Forestation, *India(Narmada River), *Flood control, Watersheds(Basins).

Aiming at flood control and soil erosion via afforestation, for the 1st time in India, a scheme on ecology of the upper catchment area of River Narmada has been taken up under the sponsorship of the Council of Scientific and Industrial Research, Government of India, and is being executed in 4 phases. The present series of papers pertains to Phase-I of the project, phytosociological survey of the forest vegetation from the source of the river at Amarkantak up to Jabalpur. The area covers a linear distance of about 310 km and an approximate area of about 20,407 sq km. Of this total area, the investigations presented here cover an approximate area of about 7310 sq km (From Manot to Jabalpur). The meteorological data available has been computed as per the system of Thornthwaite to arrive at figures of water balance. This has enabled to distinguish 4 eco-climate zones, with varying climatic indices. Growth and distribution of different forest trees have been observed to behave differently in the different eco-climatic zones distinguished and in relation to topography also. A study of correlation of the existing forest vegetation in the different 4 eco-climatic zones is the subject of the current series of papers.--Copyright 1973, Biological Abstracts, Inc.
W74-13368

GIGANTIC PIPE RESCUES A TOWN FROM FLOODING.
For primary bibliographic entry see Field 8A.
W74-13447

USE OF DRAINAGE PATTERNS AND DENSITIES TO EVALUATE LARGE SCALE LAND AREAS FOR RESOURCE MANAGEMENT,
Minnesota Univ., St. Paul. Dept. of Horticultural Science.
J. Kuska, and V. A. Lamarra, Jr.
J Environ Syst, Vol 3, No 2, p 85-100, 1973, Illus.

Descriptors: *Drainage patterns(Geologic), Drainage, Analysis, *Analytical techniques, *Minnesota, Watersheds, *Watershed management, Resources development, *Land management, Drainage density, Soil texture, Vegetation.

Objective large scale land capability evaluation techniques are needed if man is going to be able to properly plan where development should take place in the landscape. A 6800 sq. mile watershed (St. Croix River, Minnesota) was studied using a new technique called 'pattern analysis'. By correlating drainage densities to soil textures and vegetation, interferences can be made as to the innate ecological diversity and management potential of a watershed. This information should assist the resource manager in recognizing the diversified nature of a major watershed along with which areas in it are best suited for such functions as road building, logging, recreation development, and wildlife management.--Copyright 1974, Biological Abstracts, Inc.
W74-13453

PLANT POPULATION AND HUMIDITY RELATIONSHIPS IN GRASSLAND: THE QUESTION OF EVALUATING POPULATION SAMPLES, (IN GERMAN),
For primary bibliographic entry see Field 2I.
W74-13491

ECOLOGICAL SURVEY OF THE VENEZUELAN WESTERN LLANOS: IV. THE WESTERN PART OF APURE STATE, (IN SPANISH),
Universidad de Los Andes, Merida (Venezuela). Facultad de Ciencias.
G. Sarmento, M. Monasterio, and J. Silva.
Acta Cient Venez. Vol 22, No 5, p 170-180, 1971. Illus. English summary.
Identifiers: Apure, Crops, Forests, Savannas, *Venezuela, *Land classification.

The regional units of the western part of the Apure State, in southwestern Venezuela are discussed. Four landscapes and 7 land-systems were delimited within this 10,000 km2 area. Each land-system is analyzed in terms of component landforms, the main features of the corresponding soils, and the principal plant communities. The actual and potential land use, as well as the ecological limiting factors within each system are also considered. The region is mostly covered with humid savannas occurring on silty alluvial or eolian deposits, while dry savannas occur on well drained sandy soils of river banks and dunes. On the seasonally waterlogged lowlands with heavy soils, different swamp communities appear. Forests only occur in the western part of the area where they form a continuous high forest that extends eastwards as narrow galleries along the main rivers. The physical and chemical soil conditions strictly limit the development of commercial crops within the whole savanna region, the agriculture being only possible on the best drained soils of the forested zones, where there is neither excess nor dificit of water throughout the year. (See also W74-13500)--Copyright 1973, Biological Abstracts, Inc.
W74-13499

ECOLOGICAL SURVEY OF THE VENEZUELAN WESTERN LLANOS: III. THE SOUTHERN PART OF THE BARINAS STATE (IN SPANISH),
Universidad de Los Andes, Merida (Venezuela). Facultad de Ciencias.
M. Monasterio, G. Sarmiento, and J. Silva.
Acta Cient Venez. Vol 22, No 5, p 152-169, 1971. Illus. English summary.
Identifiers: *Barinas, Forestation, Vegetational, *Venezuela, Savannas, *Land classification.

This survey covers 8000 km2 of Barinas State in western Venezuela. This was the most densely forested area in the whole Venezuelan Llanos with several types of lowland tropical seasonal forests covering 70% of the surface. At present, a dramatic deforestation is steadily in progress, giving rise to secondary grasslands and agricultural fields. The remaining 30% of the surface shows a complex mosaic of humid savannas, dry savannas and seasonal or permanent marshes. Three landscapes and 10 land-systems were recognized within this region on the basis of geomorphological, pedological and vegetational patterns. Each of these units is described in terms of land-forms, soil types, plant communities, landscape genesis and actual and potential land use. A particular emphasis is given to the forest types, discussing their structure, floristic composition and leaf function of canopy species, relating then these features to the main ecological stress in the area: annual water balance. (See also W74-13499)--Copyright 1973, Biological Abstracts, Inc.
W74-13500

4B. Groundwater Management

DEVELOPMENT AND MANAGEMENT OF GROUNDWATER IN RELATION TO PRESERVATION OF DESERT PUPFISH IN ASH MEADOWS, SOUTHERN NEVADA,
Nevada Univ., Reno. Desert Research Inst.
R. L. Bateman, A. L. Mindling, and R. L. Naff.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 271, $3.75 paper copy, $2.25 microfiche. Technical Report Series H-W, Publication No 16, 1974. 39 p, 21 fig, 5 tab, 21 ref, 3 append. OWRT C-3038(3676)(1).

Descriptors: *Computer models, *Groundwater, *Water resources development, *Water law, Carbonate rocks, Springs, Wells, Irrigated land, Fish conservation, Great basin, *Nevada, Arid climates, Model studies, Environmental effects.
Identifiers: *Pupfish, Ash Meadows(Nev).

Aim of this research was development and use of a digital ground-water flow simulation model of the Ash Meadows area of southwestern Nevada to evaluate effects of various ground-water development alternatives. Response of water levels in the region to pumping was critical because of the existence of certain species of rare desert pupfish. These small fish inhabit several springs in the area while one species exists only in a limestone sinkhole named 'Devils Hole'. Two general approaches were taken to evaluate management alternatives. In the first, only existing facilities were considered and the model stressed with various annual pumping volumes. In the second, annual pumping volume was held constant and effects of hypothetical wells in various locations simulated. The study was demonstrated that a ground-water flow simulation model can be successfully utilized to analyze effects of manipulation of a large, complex ground-water flow system. Primary limitation of modeling techniques was their inability to deal with small scale inhomogeneities of the aquifer system; this because either they could not be defined or they were 'ignored' by the coarseness of the model grid.
W74-12752

DISPOSAL OF HEATED WATER THROUGH GROUNDWATER SYSTEMS - VOL. I: TECHNICAL AND ECONOMIC FEASIBILITY,
Kansas Univ., Lawrence. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W74-12753

DISPOSAL OF HEATED WATER THROUGH GROUNDWATER SYSTEMS, VOLUME II, USER'S MANUAL NUMERICAL SIMULATION OF FLUID FLOW AND HEAT TRANSFER IN GROUNDWATER SYSTEMS,
Kansas Univ., Lawrence. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W74-12754

INTERTEMPORAL ALLOCATION OF GROUNDWATER IN THE CENTRAL OGALALA FORMATION: AN APPLICATION OF A MULTISTATE SEQUENTIAL DECISION MODEL,
Haile Selassie I Univ., Alem Maya (Ethiopia).
For primary bibliographic entry see Field 6B.
W74-12787

ADMINISTRATION OF GROUNDWATER AS BOTH A RENEWABLE AND NONRENEWABLE RESOURCE,
Idaho Bureau of Mines and Geology, Moscow.
D. R. Ralson.
Water Resources Bulletin, Vol 9, No 5, p 908-917, 1973. 4 fig, 6 ref.

Descriptors: *Groundwater resources, *Administration, *Appropriation, Water allocation(Policy), Idaho, Groundwater basins, Water yield, Economic efficiency, Groundwater flow, Legislation, Groundwater mining, Water storage.
Identifiers: Raft River Basin(Idaho).

While groundwater represents both a stock and flow resource, state codes in the western states often focus on the flow aspects alone. The inappropriateness of this policy is examined by scrutinizing the administrative techniques of allocating this water resource in the Raft River Basin, Idaho. Idaho statutes specify that 'full economic development' of the resource be achieved subject to the condition that 'reasonable groundwater pumpage levels' are maintained. Thus groundwater pumpage is restricted to the flow portion of the resource. The Raft Basin, approximately 1510 sq. miles in dimension, has been designated a critical groundwater area. Such a designation restricts future applications to appropriate groundwater while not limiting existing pumpers because existing pumping exceeds the basin's water yield. This designation of the basin fails to accomplish either of the 2 objectives stated in the statute. Full economic development is not achieved because undeveloped land is present in the basin where little or no water level decline has occurred. The second objective of limiting groundwater pumping to the flow portion is also not being achieved. Water is and will continue to be taken from storage in localized areas without decreasing the total groundwater outflow from the basin. (Schroeder-Wisconsin)
W74-12792

FUNDAMENTALS OF TRANSPORT PHENOMENA IN POROUS MEDIA.
International Association for Hydraulic Research, Delft (Netherlands); and International Society of Soil Science, Amsterdam (Netherlands).
For primary bibliographic entry see Field 2F.
W74-12811

MORTALITY FROM CANCER AND CARDIOVASCULAR DISEASES IN THE COUNTY BOROUGHS OF ENGLAND AND WALES CLASSIFIED ACCORDING TO THE SOURCES AND HARDNESS OF THEIR WATER SUPPLIES, 1958-1967,
Stocks (Percy) Colwyn Bay (Wales).
For primary bibliographic entry see Field 5C.
W74-12818

EVALUATION OF CAPILLARY PROPERTIES OF CAPROCKS,
Wyoming Univ., Laramie. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 2F.
W74-12820

SUMMARY OF LATEST WORKS ON UNSTEADY FLOW OF LIQUIDS THROUGH POROUS MEDIA,
Institut Neftekhimicheskoi i Gazovoi Promyshlennosti, Moscow (USSR).
For primary bibliographic entry see Field 2F.
W74-12824

SOME RECENT APPLICATIONS OF THE THEORY OF DISPERSION IN POROUS MEDIA,
Ecole Nationale Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
For primary bibliographic entry see Field 2F.
W74-12854

COSTS OF LAND SUBSIDENCE DUE TO GROUND WATER WITHDRAWAL,
Texas A and M Univ., College Station. Water Resources Inst.
J. P. Warren, L. L. Jones, W. L. Griffin, and R. D. Lacewell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 289, $4.75 in paper copy, $2.25 in microfiche. Technical Report No 57, July 1974. 79 p, 9 fig, 5 tab, 13 ref, 2 append. OWRT A-023-TEX(1). 14-31-0001-3844, 14-31-0001-4044.

Descriptors: *Land subsidence, *Groundwater, *Withdrawal, Evaluation, *Costs, Projections, *Texas, Water demand, Saline water intrusion, Tidal effects.
Identifiers: *Houston-Baytown area(Tex).

The Houston-Baytown area of Texas is experiencing subsidence of the land surface due to excessive withdrawals of ground water. Significant property damages and losses have resulted from encroachment of tidewater and permanent or temporary flooding. This study estimates the annual average subsidence related costs at $14.6 million for the 1969-73 period. A 300 square mile study area was identified and sampled. Historical costs were estimated at $109.6 million (1943-73). Over $53 million in costs were associated with a six foot tide in 1973. Recurrence of such a tide, given five more ft. of subsidence, could result in costs of over $63 million. Breakeven analysis implied economic justification for withdrawing only that quantity of ground water that would result in no subsidence. Water demand above that rate should be imported in order to minimize total costs to the area. Importation of up to 133 billion gallons a year would be justified to meet demand and avoid subsidence.
W74-12867

CONFERENCE ON RECYCLING TREATED MUNICIPAL WASTEWATER THROUGH FOREST AND CROPLAND.
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W74-12869

RENOVATING SECONDARY EFFLUENT BY GROUNDWATER RECHARGE WITH INFILTRATION BASINS,
Agriculture Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5D.
W74-12877

PHOSPHORUS AND NITRATE LEVELS IN GROUNDWATER AS RELATED TO IRRIGATION OF JACK PINE WITH SEWAGE EFFLUENT,
Forest Service (USDA), Cadillac, Mich. North Central Forest Experiment Station.
For primary bibliographic entry see Field 5D.
W74-12878

MT. SUNAPEE STATE PARK, NEW HAMPSHIRE SPRAY IRRIGATION PROJECT,
New Hampshire Water Supply and Pollution Control Commission, Concord.
For primary bibliographic entry see Field 5D.
W74-12893

ECOLOGICAL AND PHYSIOLOGICAL IMPLICATIONS OF GREENBELT IRRIGATION WITH RECLAIMED WATER,
California Univ., Riverside. Dept. of Plant Sciences.
For primary bibliographic entry see Field 5D.
W74-12895

FINITE ELEMENT ANALYSIS OF THREE-DIMENSIONAL GROUNDWATER FLOW PROBLEMS,
University of Wales Inst. of Science and Tech., Cardiff. Dept. of Civil Engineering and Building Technology.
For primary bibliographic entry see Field 2F.
W74-12984

GROWTH AND DECAY OF GROUNDWATER MOUNDS INDUCED BY PERCOLATION,
California Univ., Davis.
For primary bibliographic entry see Field 2F.
W74-12987

ATOLL PERMEABILITY CALCULATED FROM TIDAL DIFFUSION,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 2F.
W74-12995

SIMULTANEOUS EVALUATION OF DRAWDOWN DATA FROM SEVERAL OBSERVATION WELLS BY MEANS OF A MODIFICATION OF THE WALTON METHOD,
Technische Hogeschool, Delft (Netherlands). Geophysical Lab.
O. Koefoed.
Journal of Hydrology, Vol 21, No 4, p 315-319, 1974. 3 fig, 2 ref.

Descriptors: *Aquifer testing, *Aquifer characteristics, Transmissivity, Storage coefficient, Drawdown, Wells, Pump testing.
Identifiers: *Semi-confined aquifer, *Leakage factor.

A modification of the Walton method is presented in which drawdown data from several observation wells are fitted simultaneously to the curves of a standard graph. The use of this modified method permits a more balanced evaluation of the drawdown data to be made. Also the length of time over which the drawdown must be measured can be shortened appreciably when the modified evaluation method is applied. (Schicht-ISWS)
W74-12999

CHEMICAL WATER TYPES AND THEIR DISTRIBUTION IN SPACE AND TIME IN THE AMSTERDAM DUNE-WATER CATCHMENT AREA WITH ARTIFICIAL RECHARGE,
Vrije Universiteit, Amsterdam (Netherlands). Inst. of Earth Sciences.
G. B. Engelen, and A. J. Roebert.
Journal of Hydrology, Vol 21, No 4, p 339-556, 1974. 8 fig, 1 tab, 2 ref.

Descriptors: *Groundwater recharge, *Saline water intrusion, *Groundwater movement, *Water types, *Aquifer systems, Hydrology, Geology, Encroachment, Artificial recharge, Geohydrologic units, Exploitation, Hydrogeology, Water management(Applied), Distribution patterns.
Identifiers: Amsterdam(Rhine River).

The geology, hydrology, and types of groundwater exploitation of the Amsterdam dune-water catchment area with artificial recharge of water from the Rhine River are described. A classification of natural and artificial water types in the catchment is presented by means of Stiff diagrams, together with their genesis and distribution in space and time. The natural vertical, hydrochemical zonation in fresh, brackish, and salt groundwaters has been disturbed by decades of overdraft and the use of artificial recharge which was started in 1957. Various mixed water types resulted. Study produced an enlightened concept of water movement in and between the shallow and deep aquifers involved. A detailed case study of a part of the catchment area covers a period of about 50 years. The decisive influence of geological inhomogeneities on the patterns of saltwater encroachment during the period of overdraft and on the patterns of infiltration of river water into the deep aquifer after the start of artificial recharge is demonstrated. The shifts in the subsurface positions of the various water types due to changes in groundwater management of the catchment area are elucidated, and an example of displacement and dispersion phenomena under field operating conditions is given. (Harmeson-ISWS)
W74-13004

AQUIFER ANALYSIS USING BACKWARD DIFFERENCE METHODS,
Birmingham Univ. (England). Dept. of Civil Engineering.
K. R. Rushton.
Journal of Hydrology, Vol 22, No 3-4, p 253-269, 1974. 7 fig, 5 tab, 7 ref.

Descriptors: *Groundwater, *Computers, *Numerical analysis, Mathematics, *Model studies, Simulation analysis, Groundwater movement, Analytical techniques, Comparative costs, Analog computers, Analog models, Aquifers, Unsteady flow.
Identifiers: *Finite difference formulations, *Error analysis, Method comparisons, Over relaxation, Resource management.

Two backward difference methods of solving time dependent aquifer problems, the systematic overrelaxation method and the modified alternating direction method, were critically examined. Both methods were tested for a variety of problems ranging from single well problems with variable mesh spacing to complex multiwell regional groundwater problems. Recommendations were made concerning the choice of method. (Prickett-ISWS)
W74-13012

HYDROGEOLOGY OF THE POTTSVILLE FORMATION IN NORTHEASTERN OHIO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-13015

QUALITY OF GROUND WATER IN BIKANER DISTRICT OF WESTERN RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
K. S. Gajbhiye, A. S. Kolarkar, and O. P. Bhatia.
Annals of Arid Zone, Vol 12, No 1 and 2, p 65-70, March and June, 1973. 3 tab, 10 ref.

Descriptors: *Groundwater, *Salinity, *Water quality, *Irrigation, Alkalinity, Water, Sodium chloride, Boron, Calcium, Magnesium.
Identifiers: *India(Rajasthan).

Samples taken in the Bikaner district of western Rajasthan to ascertain groundwater quality were shown to be mostly saline to highly saline in nature, with a substantial amount of sodium chloride. Calcium and magnesium were also found. The content of boron did not present any acute problems. Water quality standards were not met for agricultural use of irrigated waters, but nearly all waters in the area seem to be good for animal consumption, particularly sheep. (Mastic-Arizona)
W74-13151

ARIZONA'S WATER RESOURCES,
Arizona Water Commission, Phoenix.
For primary bibliographic entry see Field 6D.
W74-13152

UTILIZATION OF DISUSED COAL MINES AS WATER STORAGE RESERVOIRS,
Teesside Polytechnic, Middlesbrough (England). Dept. of Civil Engineering.
T. Cairney.
J Hydrol (Amst). Vol 19, No 3, p 251-258. 1973. Illus.

Descriptors: *Water storage, Underground, *Reservoirs, *Mine water.
Identifiers: Mines.

With the current conflict of land conservation and water resources interests, the potential underground storage in disused coal workings offers a possible solution. Where conditions are suitable, mine workings offer surprisingly large yields at low cost.--Copyright 1974, Biological Abstracts, Inc.
W74-13164

AVAILABILITY OF FRESH GROUND WATER IN NORTHEASTERN WORCESTER COUNTY, MARYLAND: WITH SPECIAL EMPHASIS ON THE OCEAN CITY AREA,
Geological Survey, Parkville, Md.
J. M. Weigle.
Maryland Geological Survey, Baltimore, Report of Investigations No 24, 1974. 64 p, 19 fig, 7 tab, 24 ref.

Descriptors: *Hydrogeology, *Groundwater, *Maryland, Saline water intrusion, Aquifers, Artesian aquifers, Water yield, Transmissivity, Hydrologic data, Data collections.
Identifiers: *Ocean City(Md).

Fresh groundwater in northeastern Worcester County, Maryland, is restricted to sediments about 450 feet thick between the land surface and the top of the St. Marys Formation. The water is available in the Pleistocene aquifer under water-table and semiconfined conditions and in the Pocomoke and Manokin aquifers under confined conditions. The Ocean City-Manokin aquifer system is potentially very productive. Its transmissivity averages about 10,000 square feet per day; potential short-term groundwater yields are estimated to exceed 1,000 gpm and may exceed 12,000 gpm in the northern part of the area. Yields from the Pleistocene and Pocomoke aquifers are estimated to range from 500 to 2,000 gpm each. Withdrawals at Ocean City averaged 3.04 million gallons per day in 1971. More water is withdrawn from the Ocean City-Manokin aquifer system at Ocean City than is available from underflow in that system, yet the water levels showed a net rise indicating an increase in storage during 1970-72. This suggests that there is considerable recharge to the Ocean City-Manokin system by vertical leakage from the water-table deposits. In 1971, 1.1 billion gallons of water was pumped from the Ocean City-Manokin aquifer system. It is estimated that several times that rate of withdrawal could be sustained if the entire thickness of the aquifer were utilized effectively. However, there is a possibility of saltwater encroachment. The effects of the saltwater on the public supply could be postponed by drilling new wells west of the present well fields. (Knapp-USGS)
W74-13175

AN EVALUATION OF THE MAGOTHY AQUIFER IN THE ANNAPOLIS AREA, MARYLAND,
Geological Survey, Parkville, Md.
F. K. Mack.
Maryland Geological Survey, Baltimore, Report of Investigations No 22, 1974. 75 p, 34 fig, 2 plates, 7 tab, 31 ref, 5 append.

Descriptors: *Hydrogeology, *Groundwater, *Maryland, Surface-groundwater relationships, Safe yield, Water yield, Saline water intrusion, Analog models.
Identifiers: *Annapolis(Md), *Magothy aquifer(Md).

The Magothy aquifer was studied as a source for future water supplies in the Annapolis area in Anne Arundel County, Maryland. The Magothy aquifer is a layer of coarse gray to white sand from 100 to 200 feet thick cropping out in a belt 2 to 3 miles wide on the west side of Chesapeake Bay. The aquifer dips southeastward at approximately 30 feet per mile from an altitude of about 100 feet in upland parts of the outcrop area to about 300 feet below sea level at the southeast end of the Annapolis peninsula. The saline waters of Chesapeake Bay and its estuaries overlie a large part of the area in which the aquifer occurs at depth and also a part of its outcrop area. The Magothy aquifer is a part of a larger hydrologic system including the streams in its outcrop area, overlying and underlying geologic formations, and Chesapeake Bay and its estuaries. Heavy development of the Magothy aquifer will reduce the amount of water available from the streams and adjacent formations and, conversely, further development of adjacent formations will reduce the availability of water from the Magothy aquifer. The aquifer is currently yielding water at a rate of 4 mgd in the Annapolis area. There is presently (1973) little danger of saltwater contamination. Electric-analog model studies indicate that the Magothy aquifer is capable of yielding about 60 mgd in the Annapolis area, if the potentiometric surface is lowered to near its top. About 100 years would be required for water from the estuaries to move through the confining beds to the aquifer under the maximum head differentials that could be developed. (Knapp-USGS)
W74-13176

REGIONAL FLOW SYSTEM AND GROUNDWATER QUALITY IN WESTERN OHIO,
Geological Survey, Columbus, Ohio.
S. E. Norris.
Journal of Research, US Geological Survey, Vol 2, No 5, p 527-531, September-October, 1974. 1 fig, 10 ref.

Descriptors: *Hydrogeology, *Water chemistry, *Ohio, *Groundwater, Water quality, Glacial drift, Till, Aquifers, Carbonate rocks, Groundwater movement, Limestones, Dolomite.

Most deep wells drilled in the carbonate aquifers in western Ohio tap a recognizable regional flow system encompassing all or parts of several major basins. The principal recharge area includes the higher, central part of the region, where much of

e terrain is hummocky glacial moraine. The prin-pal discharge areas are the valleys of the major reams and lowlands along Lake Erie. Ground-ater moving through this system undergoes a rogressive change in chemical quality, from a calci-um bicarbonate type in recharge areas to a calci-n sulfate type in discharge areas. Changes in hemical constituents are orderly and predictable. Knapp-USGS)
74-13181

ATER RESOURCES OF THE MAUMEE IVER BASIN, NORTHEASTERN INDIANA,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13191

ROUND-WATER FAVORABILITY AND SUR-CIAL GEOLOGY OF PARTS OF THE MEDX-EKEAG RIVER AND PRESTILE STREAM ASINS, MAINE,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13192

ROUND-WATER FAVORABILITY AND SUR-CIAL GEOLOGY OF THE LOWER ST. JOHN IVER VALLEY, MAINE,
eological Survey, Washington, D.C.
or primary bibliographic entry see Field 7C.
74-13193

XPERIMENTAL DEVELOPMENT OF POTA-LE WATER SUPPLY FOR NEW SOUTH POLE TATION,
aval Civil Engineering Lab., Port Hueneme, alif.
S. Williams.
vailable from NTIS, Springfield, Va 22161 as D-777 037, Price $3.75 printed copy; $2.25 icrofiche. Technical Note N-1328, February 74. 27 p, 7 fig, 1 tab, 2 append.

escriptors: *Water wells, *Antarctic, *Ice, Melting, Snow, Glaciers, Water supply, Water eld, Heat balance.
entifiers: *Rodriguez wells.

well was drilled in the ice at South Pole, and the roduction capability and equipment were evalu-ed by operating the well during the antarctic mmer. The prime objective was to determine the asibility of installing an operational well for the ater supply of a new South Pole Station. The peration of a Rodriguez well consists of circulat-g water from a pond deep in the snow through a eat exchanger and back into the well. Water is verted to the station storage system as required. he depth at which a stabilized water pond will be tablished appears to be 250 feet or slightly elow. Based on calculations from heat-exchanger ata, a water-pond diameter of 35 feet was main-ined with a heat input of approximately 300,000 tu. With an input of 500,000 Btu the well diame-r was approaching 40 feet before the heat was duced to conserve fuel. (Knapp-USGS)
74-13197

UMMARY GROUND-WATER RESOURCES OF EAVER COUNTY, PENNSYLVANIA,
eological Survey, Harrisburg, Pa.
W. Poth.
nnsylvania Geological Survey, Fourth Series, ater Resource Report 39, 1973. 39 p, 4 fig, 1 ate, 7 tab, 22 ref.

escriptors: *Water resources, *Groundwater, Pennsylvania, Alluvial channels, Water yield, ydrogeology, Hydrologic data, Water pollution urces, Coal mine wastes, Water quality, Oil ells.
entifiers: *Beaver County(Penn).

Groundwater is available in Beaver County, Pennsylvania, from rocks of the Pennsylvanian Monongahela, Conemaugh, Allegheny, and Pottsville Groups and from unconsolidated Quaternary deposits. Groundwater occurs largely in the unconsolidated Quaternary alluvial deposits that are present as terraces and modern flood plains along the major streams of the county. Yields of over 1000 gpm have been reported from wells drilled in these alluvial deposits. Small supplies of water are also available in the bedrock, but the water is generally of poor quality. Most of the water is of acceptable quality. The water is generally high in iron, and much of the bedrock below several hundred feet may contain saltwater. There is no known overdraft of groundwater anywhere in the county. The locations of sources of pollution, such as sanitary landfills and septic tanks, are a major factor in the selection of well sites. The discharge from abandoned strip and deep mines is a major source of pollution. Oil and gas wells that were abandoned and not properly plugged are another source of pollution. (Knapp-USGS)
W74-13200

SUMMARY GROUND-WATER RESOURCES OF WASHINGTON COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
T. G. Newport.
Pennsylvania Geological Survey, Fourth Series, Water Resource Report 38, 1973. 32 p, 5 fig, 6 tab, 12 ref.

Descriptors: Water resources, *Groundwater, *Pennsylvania, Alluvial channels, Water yield, Hydrogeology, Hydrologic data, Water pollution sources, Coal mine wastes, Water quality, Oil wells.
Identifiers: *Washington County(Penn).

Groundwater is available in Washington County, Pennsylvania, from rocks of the Pennsylvanian Monongahela and Conemaugh Groups, the Permian-Pennsylvanian Washington Formation, the Permian Greene Formation, and from unconsolidated Quaternary deposits. The alluvium is generally permeable and, when saturated, will yield moderate to large supplies of water, depending upon the degree of sorting by grain size. Groundwater in a bedrock occurs largeiy in secondary openings, such as joint planes or solution openings. The Greene Formation and the Monongahela Group are poor waterbearers because of the smallness and scarcity of fractures. The Washington Formation crops out extensively in the county, but is also a poor waterbearer. The Conemaugh Group crops out in the extreme northern part of the county and along some stream valleys in other parts of the county. This group is a source of small to moderate supplies of water; the median yield is 5 gpm. Extremes in quality are due to both manmade and natural causes. The most common undesirable constituent of the groundwater is iron. Water drilled in aquifers too far below the level of the major drainage systems shows excessive mineralization. There is no known overdraft of water in Washington County. The greatest water problem in the county is pollution of the water resources by drainage from coal-mining operations. Oil and gas wells that were abandoned but not properly plugged are another source of groundwater pollution. (Knapp-USGS)
W74-13201

SUMMARY GROUND-WATER RESOURCES OF WESTMORELAND COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
T. G. Newport.
Pennsylvania Geological Survey, Fourth Series, Water Resource Report 37, 1973. 49 p, 9 fig, 1 plate, 6 tab, 12 ref.

Descriptors: *Water resources, *Groundwater, *Pennsylvania, Alluvial channels, Water yield, Hydrogeology, Hydrologic data, Water pollution sources, Coal mine wastes, Water quality, Oil wells.
Identifiers: *Westmoreland County(Penn).

Groundwater is available in Westmoreland County, Pennsylvania, from rocks ranging in age from the Mississippian Pocono Group to Quaternary alluvium. The alluvium overlies bedrock in the major stream valleys in the county. The yields of wells drilled from 15 to 85 feet in the alluvium range from 15 to 700 gpm and average 230 gpm. Of the consolidated aquifers, the Pennsylvanian Conemaugh and Allegheny Groups yield small to moderate supplies of water. The Pottsville Group has yields of 20 to 500 gpm, depending on whether the wells penetrate the full thickness of the sandstone. The Mississippian Pocono Group is deeply buried throughout most of the county, but in its outcrop areas there are many hillside springs which yield 5 to 100 gpm. Many samples are high in iron content. In the western part of the county, saltwater is a problem in any well deeper than 50 to 100 feet. The amount of groundwater used for most purposes has probably decreased due to improved plant design and to the use of more efficient manufacturing techniques. Since there is relatively little use of groundwater in the county, there is no known overdraft. The greatest water problem in the county is the contamination of water resources by drainage from coal-mining operations. Other sources of pollution are the numerous oil and gas wells that were abandoned but not properly plugged. (Knapp-USGS)
W74-13202

SUMMARY GROUND-WATER RESOURCES OF BUTLER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
C. W. Poth.
Pennsylvania Geological Survey, Fourth Series, Water Resources Report 36, 1973. 49 p, 4 fig, 1 plate, 7 tab, 27 ref.

Descriptors: *Water resources, *Groundwater, *Pennsylvania, Alluvial channels, Water yield, Hydrogeology, Hydrologic data, Water pollution sources, Coal mine wastes, Water quality, Oil wells.
Identifiers: *Butler County(Penn).

Groundwater is available in Butler County, Pennsylvania from rocks of the Mississippian Pocono Group, the Pennsylvanian Conemaugh, Allegheny, and Pottsville Groups, and from unconsolidated Quaternary deposits. The Quaternary outwash deposits and some of the Quaternary lacustrine deposits are highly permeable and are capable of yielding 100 gpm or more to wells. Rocks of the Conemaugh Group underlie about two-thirds of the county. Reported yields of wells in the Conemauch range from less than 5 gpm to more than 100 gpm; about half of the wells yield 20 gpm or more. The Allegheny Group crops out in the northern half of the county and along the major stream valleys throughout the county. This group is capable of supplying moderate amounts of water to wells. Yields range from less than 5 gpm to more than 100 gpm, and about half the wells yield 50 gpm or more. The Pottsville Group crops out along the major stream valleys in the northern part of the county. Yields of wells in the Pottsville range from less than 5 gpm to more than 300 gpm, and average 36 gpm. The Burgoon Sandstone of the Pocono Group occurs in the northeastern part of the county along the Allegheny River and the lower reaches of Bear Creek. It is an excellent aquifer; reported yeilds range from 9 to 260 gpm and average 82 gpm. High iron content is the main water quality problem in the county. There is no known overdraft of groundwater. The locations of sources of pollution, such as sanitary landfills and septic tanks, are a major factor in the selection of well sites. The discharge from abandoned strip and deep mines is a major source of pollution. Oil and gas wells that were abandoned and not properly plugged are another source of pollution. (Knapp-USGS)
W74-13203

SUMMARY GROUND-WATER RESOURCES OF ALLEGHENY COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
J. T. Gallaher.
Pennsylvania Geological Survey, Fourth Series, Water Resource Report 35, 1973. 71 p, 12 fig, 1 plate, 9 tab, 12 ref.

Descriptors: *Water resources, *Groundwater, *Pennsylvania, Alluvial channels, Water yield, Hydrogeology, Hydrologic data, Water pollution sources, Coal mine wastes, Water quality, Induced infiltration, Oil wells.
Identifiers: *Allegheny County(Penn), *Pittsburgh(Penn).

Groundwater is available in Allegheny County, Pennsylvania from rocks of the Permian-Pennsylvanian Washington Formation, the Pennsylvanian Monongahela, Conemaugh, and Allegheny Groups, and from unconsolidated Quaternary deposits. The Washington Formation and the Monongahela Group are not important as aquifers. The Conemaugh Group crops out extensively north of the Ohio and Allegheny Rivers and contains some of the most important aquifers in the county: the Connellsville, Morgantown, Saltburg, Buffalo and Mahoning sandstones. These formations are generally persistent and waterbearing throughout the county, and have yields ranging from 1 or 2 gpm to 100 gpm. The Allegheny Group is found in the northeastern part of the country. Within this group, the most important aquifers are the Freeport sandstone, which yields 5 to 75 gpm, and the Worthington sandstone, which generally yields enough water for all domestic needs. Water supplies are also available from the Quaternary alluvium, which yields from 5 to 3000 gpm, depending upon the degree of sorting by grain size. Groundwater in the younger geologic formations is usually low in dissolved solids, while water from the deeply buried older formations is hard and sometimes high in chlorides and iron. Despite heavy groundwater pumpage in Allegheny County, there are relatively few instances of overdraft. Use of induced infiltration has allowed high yields and relatively close spacing of wells. Discharge from abandoned strip and deep mines is a major source of pollution. The hundreds of oil and gas wells that were drilled in the county are another source. (Knapp-USGS)
W74-13204

SUMMARY GROUND-WATER RESOURCES OF ARMSTRONG COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
C. W. Poth.
Pennsylvania Geological Survey, Fourth Series, Water Resources Report 34, 1973. 38 p, 6 fig, 1 plate, 7 tab, 27 ref.

Descriptors: *Water resources, *Groundwater, *Pennsylvania, *Alluvial channels, Water yield, Hydrogeology, Fractures(Geologic), Hydrologic data, Water pollution sources, Coal mine wastes, Water quality, Landfills, Septic tanks, Oil wells.
Identifiers: *Armstrong County(Penn).

Groundwater occurs in Armstrong County, Pennsylvania in unconsolidated deposits along the stream valleys, especially the Allegheny River, and in fractures in the bedrock. Yields of wells in the unconsolidated deposits average about 400 gpm and yields as high as 1,100 gpm have been reported. Wells drilled into the bedrock yield considerably less water than those in the unconsolidated material. The average yield of wells in the bedrock is about 25 gpm, although some wells yield less than 1 gpm and some as much as 350 gpm. The water is generally hard and high in calcium, magnesium, sulfate, and iron. Water from deeply buried rocks is also high in chloride. There is no known overdraft of groundwater, but overdraft is possible in the future. The locations of sources of pollution, such as sanitary landfills and septic tanks, are a major factor in the selection of well sites. The chief water problem is contamination by drainage from coal-mining operations. Other sources of contamination are the hundreds of oil and gas wells that were abandoned but not properly plugged. The casings have been removed or are severely corroded, allowing saltwater to rise in the boreholes and contaminate shallow freshwater aquifers. (Knapp-USGS)
W74-13205

INFLUENCE OF RECHARGE BASINS ON THE HYDROLOGY OF NASSAU AND SUFFOLK COUNTIES, LONG ISLAND, NEW YORK,
Geological Survey, Washington, D.C.
G. E. Seaburn, and D. A. Aronson.
Available from GPO, Washington, DC 20402, Price $1.75 (paper copy). Water-Supply Paper 2031, 1974. 66 p, 30 fig, 1 plate, 23 tab, 44 ref.

Descriptors: *Artificial recharge, *Storm runoff, *Urban hydrology, *New York, Urban runoff, Pit recharge, Groundwater recharge, Water management(Applied).
Identifiers: *Long Island(NY).

The hydrology of three recharge basins on Long Island, N.Y., (Westbury, Syosset, and Deer Park basins) was studied. The average percentages of precipitation flowing into each basin were roughly equivalent to the average percentages of impervious areas in the total drainage areas of the basins. Inflow hydrographs for each basin typify the usual urban runoff hydrograph--steeply rising and falling limbs, sharp peaks, and short time bases. Infiltration rates averaged 0.9 fph (feet per hour) at the Westbury recharge basin, 0.8 fph at the Syosset basin, and 0.2 fph at the Deer Park recharge basins. Low infiltration rates at Deer Park resulted mainly from silt, clay, and organic debris washed in from construction sites, and a lack of a well-developed plant-root system on the floor of the basin. The apparent rate of movement of storm water through the unsaturated zone below each basin averaged 5.5 fph at Westbury, 3.7 fph at Syosset, and 3.1 fph at Deer Park. On the average, a 1-inch rainfall resulted in a peak rise of the water table directly below each basin of 0.5 foot; a 2-inch rainfall resulted in a peak rise of about 2 feet. The mound commonly dissipated within 1 to 4 days at Westbury, 7 days to more than 15 days at Syosset, and 1 to 3 days at Deer Park. Average annual groundwater recharge was estimated to be 6.4 acre-feet at the Westbury recharge basin, 10.3 acre-feet at the Syosset recharge basin, and 29.6 acre-feet at the Deer Park recharge basin. Groundwater recharge in the areas where recharge basins are used is probably equivalent to or may slightly exceed recharge under natural conditions (about 148 mgd). (Knapp-USGS)
W74-13206

HYDROGEOLOGIC CHARACTERISTICS OF THE SURFICIAL AQUIFER IN NORTHWEST HILLSBOROUGH COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 2F.
W74-13208

GROUND-WATER CONDITIONS IN THE LOWER HASSAYAMPA AREA, MARICOPA COUNTY, ARIZONA,
Geological Survey, Phoenix, Ariz.
R. S. Stulik.
Arizona Water Commission, Phoenix, Bulletin 8, August 1974. 52 p, 3 fig, 5 tab, 2 ref.

Descriptors: *Water resources, *Groundwater, *Hydrologic data, *Arizona, Data collections, Water yield, Hydrogeology, Irrigation water, Stock water, Basic data collections.
Identifiers: *Hassayampa area(Ariz).

Groundwater conditions in the lower Hassayampa area of Arizona are described. The basic groundwater data are presented. More than 24,000 acres of land is irrigated with groundwater in the 550-square-mile lower Hassayampa area. The principa source of groundwater is the valley-fill deposit which consist mainly of weakly consolidated san silt, and clay; the deposits are as much as 1,20 feet thick in the center of the area. About 95,0 acre-feet of groundwater was pumped from t deposits in 1969. In 1970 the depth to water in t valley-fill deposits ranged from less than 20 to 3 feet below the land surface. From spring 1962 spring 1970, pumping for irrigation caused wate level declines of as much as 57 feet in the exte sively developed part of the area; little or water-level change took place in the undevelope part of the area. Specific-capacity values ran from 1 to 86 gpm per foot of drawdown. Di solved-solids concentrations in the groundwat range from 180 mg/liter in the northern part of t area to 3,600 mg/liter near the Gila River. Most the water contains less than 1,000 mg/liter of di solved solids. Fluoride concentrations range fro 1.2 to 13 mg/liter. Most of the water sampled co tains fluoride in excess of twice the recommende optimum value. (Knapp-USGS)
W74-13209

HYDROLOGIC PERSPECTIVE OF SURFICIA WASTE DISPOSAL,
Geological Survey, Tampa, Fla.
For primary bibliographic entry see Field 5D.
W74-13210

FEASIBILITY STUDY FOR DEVELOPMENT O HOT-WATER GEOTHERMAL SYSTEMS,
California Univ., Riverside. Inst. of Geophysi and Planetary Physics.
J. B. Combs.
Available from NTIS, Springfield, Va 22161 AD-771 016, Price $5.25 printed copy; $2. microfiche. Final Technical Report 73-2070 for A Force Office of Scientific Research, March 197 115 p, 41 ref, 4 append. AFOSR-72-2393.

Descriptors: *Geothermal studies, *Therm water, *California, *Energy, Groundwater, Wat temperature, *Feasibility studies.
Identifiers: *Geothermal energy.

Naturally occurring hot-water geothermal systen contain a single fluid phase that may be at ter peratures far above surface boiling because of t effect of pressure on the boiling point of wate Geothermal reservoirs of the hot-water type a located in the upflowing parts of major meteor water convection systems. They occur worldwi in the zones of the most recent and most inten geological activity. The development and utiliz tion of hot-water geothermal reservoirs can be f the production of power, fresh water, and heat f space heating. Three potential sites of hot-wat geothermal systems, Point Mugu, Twentynin Palms, and China Lake, all located in Californi were investigated. The geology and existing da for the Point Mugu Site are not particularly e couraging as far as the potential for a hot-wat geothermal reservoir in the area. Because of t high temperature water wells located in the vici ty of the Marine Corps Training Center at t Twentynine Palms Site, and because of the ve recent Amboy and Pisgah Craters and their a sociated extensive lava fields, further researc should be initiated in the area. A detailed surfa geologic map should be prepared for the Chi Lake Site. (Knapp-USGS)
W74-13213

INJECTING HIGHLY TREATED SEWAG INTO A DEEP-SAND AQUIFER,
Rutgers - The State Univ., New Brunswick, N Dept. of Environmental Sciences.
For primary bibliographic entry see Field 5B.
W74-13310

DESIGN, DRILLING AND COMPLETIO OPERATION, AND COST OF UNDERGROUN

ASTE DISPOSAL WELLS IN GULF COAST
GION OF TEXAS AND LOUISIANA,
llution Control and Waste Disposal, Inc., New
leans, La.
r primary bibliographic entry see Field 5B.
74-13340

LLUTION CONTROL: THE RELATION OF
ATER QUALITY PROTECTION TO EX-
ORATION FOR AND PRODUCTION OF OIL
D GAS IN THE SOUTHWEST,
xas Water Commission, Austin.
r primary bibliographic entry see Field 5G.
74-13342

OUND WATER FOR THE OIL INDUSTRY IN
XAS AND SOUTHEAST NEW MEXICO,
F. Guyton.
Oil and Water - A Symposium, Bureau of
onomic Geology, Texas University, Austin,
uary 29, 1965. p 40-47, (1965). 4 fig.

scriptors: *Irrigation, Oil industry, Alluvium,
nd, Gravel, Limestone, Aquifers, Silt, Clays,
liments, Caliche, *Groundwater, Saline water,
ackish water, Drilling fluids, Mud, Test wells,
uipment, Well casings, Well screens, *Texas,
ew Mexico, Southwest US.
ntifiers: Water-bearing formations, Gulf Coast.

e use of ground water in Texas and Southeast
w Mexico is about 12 1/2 million acre-feet per
ar or about 100 billion barrels per year. The
ited States uses about 55 million acre-feet per
ar--thus, the use in Texas is about one-fourth of
total in the United States. Various types of
und water use in Texas and Southeast New
xico are discussed; irrigation is the most
valent, comprising 88 percent of the total.
eas of ground water use and major fresh water-
aring formations in this area, and typical well
sign for the Gulf Coast are described. Where
fficient information does not exist, about such
pects of ground water as positions, thicknesses,
aracter, and extent of the water-bearing beds,
ir transmissibility and storage coefficients, con-
uction and performance records of existing
lls, water levels and artesian pressures, chemi-
quality and temperature of the water, and the
as and amounts of recharge and discharge, a
t well may be drilled. The construction of a
ge-capacity, gravel-walled well is outlined.
ampbell-NWWA)
74-13343

NUAL REPORT ON GROUND WATER IN
IZONA, SPRING 1972 TO SPRING 1973,
ological Survey, Phoenix, Ariz.
M. Babcock.
izona Water Commission Bulletin 7, April,
74. 46 p, 31 fig, 1 tab, 19 ref.

scriptors: *Arizona, *Hydrologic data,
roundwater resources, *Water levels, Ground-
ter recharge, Irrigated land, Irrigation water,
ater measurement, Water wells, Crops, Ground-
ter relationships, Surface water, Water de-
nd.
ntifiers: Economic development.

t only is the location of cities, Agricultural
as, and industries in Arizona largely deter-
ned by the availability of adequate potable
ter supplies, but the type of industry brought to
area is influenced as well. Almost 2/3 of
izona's water supply has been drawn from
undwater reservoirs for many years, prin-
ally for the irrigation of crops, though now mu-
ipal and industrial demands are rapidly and
adily increasing. Groundwater withdrawal has
ceeded 4 million acre-feet for 20 consecutive
ars so that through 1972, a total of almost 144
llion acre-feet has been withdrawn. Almost 5
llion acre-feet were withdrawn during 1972, and
mand - particularly in the Basin and Range lowlands province having more than 90% of the cultivated land and more than 80% of the State's population - again exceeded the recharge supply causing an even further decline in the water table. The 1972 estimated groundwater pumpage in Arizona, by areas of major development together with the accumulated total through 1972, is presented. A record of the change in the groundwater storage reservoirs provides an indication of the permanence of the supply and characteristics of the aquifer. Graphs and maps showing water levels in selected wells are included. (Gloyd-Arizona)
W74-13350

HYGIENIC FEATURES OF PERCOLATION WATER INTAKES (IN RUSSIAN),
Municipal Sanitary-Epidemiological Center, Pyatigorsk (USSR).
A. P. Bukhtoyarov.
Gig Sanit. Vol 37 No 7, p 93-95. 1972. Illus.
Identifiers: Groundwater, *Percolation, *Hygiene.

The artificial enrichment of ground-waters with surface waters constitutes a method suitable for increasing the yield of underground water sources and for improving the quality of the percolating water.--Copyright 1973, Biological Abstracts, Inc.
W74-13400

TRITIUM IN PRECIPITATION AND FRESH-WATER SOURCES IN ISRAEL,
Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Isotope Research.
For primary bibliographic entry see Field 5B.
W74-13444

GROUND WATER LEVEL CONTROL.
For primary bibliographic entry see Field 7B.
W74-13446

ONE FORM OF DEEP DRAINAGE OF UNDERGROUND WATERS (OB ODNOY FORME GLUBOKOGO STOKA PODZEMNYKH VOD),
G. S. Vartanyan.
Doklady Akademii Nauk SSSR, Vol 214, No 6, p 1414-1416, 1974. 2 fig, 8 ref.

Descriptors: *Model studies, *Mathematical models, *Groundwater, *Aquifers, Hydrologic aspects, Hydrologic systems, Hydrogeology, *Drainage.

The discharge of underground waters into higher recipient horizons is described. The discharge zone in the recipient horizon has a hydrodynamic cupola formed by the discharge component, and the cupola is, in most cases, hydrostatically screened by the water stream of the recipient horizon, i.e., the stream flow along a surface of rotation. The ratio of the height of the discharge cupola to the overall height of the recipient horizon is equal to the ratio of the ascending water yield to the water yield of the recipient horizon proper. The ascending water yield can also be determined by multiplying the recipient horizon water yield with a proportionality constant whose formula is presented. (Takacs-FIRL)
W74-13451

4C. Effects On Water Of Man'S Non-Water Activities

SURFACE WATER RESOURCES OF THE USSR AND THEIR CHANGE UNDER THE EFFECT OF INDUSTRIAL AND AGRICULTURAL ACTIVITY,
For primary bibliographic entry see Field 4A.
W74-12983

ANALYSIS OF URBAN LAND TREATMENT MEASURES FOR FLOOD PEAK REDUCTION,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-13043

RECLAMATION STUDIES ON BLACK MESA,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 5G.
W74-13144

MAN'S IMPACT ON THE COLORADO RIVER IN THE GRAND CANYON,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
R. Dolan, A. Howard, and A. Gailenson.
American Scientist, Vol 62, No 4, p 392-401, July/August, 1974. 9 fig, 2 tab, 10 ref.

Descriptors: *Colorado River, *River flow, *Environmental effects, Hoover Dam, Reservoirs, Geomorphology, Fluvial sediments, Dams, Flash floods, Sediments, Regime, Erosion, Discharge(Water), Deposition(Sediments), Recreation.
Identifiers: *Grand Canyon, Glen Canyon Dam, Lake Mead, Lake Powell, U.S. National Park Service.

Research was conducted to discover how and in what manner the Grand Canyon is adjusting to new and increased uses of the Colorado River, and to what extent man's use of the river is affecting these adjustments. Included in the study are pre- and post-dam hydrologic data, information on beach zone characteristics within the Grand Canyon, and evaluation of Glen Canyon Dam effects. Also investigated was man's use of the river as a result of boat trips through the Grand Canyon. Results show that because of the Glen Canyon Dam, the greatly-altered regime of the Colorado River is contributing to erosion of beach areas, and to the increase of sediments deposited in rapids and falls within the Grand Canyon, which may eventually make them unnavigable. Increased use of the river by man seems to be contributing to the erosion problem but the extent of the impact has not been quantified. (Mastic-Arizona)
W74-13149

INFLUENCE OF RECHARGE BASINS ON THE HYDROLOGY OF NASSAU AND SUFFOLK COUNTIES, LONG ISLAND, NEW YORK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-13206

CHANGES IN SEDIMENT LOADS IN RIVERS OF THE ATLANTIC DRAINAGE OF THE UNITED STATES SINCE 1900,
Geological Survey, Woods Hole, Mass.
For primary bibliographic entry see Field 5B.
W74-13215

SEASONAL EFFECTS IN FLOOD SYNTHESIS,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
E. F. Brater, S. Sangal, and J. D. Sherrill.
Water Resources Research, Vol 10, No 3, p 441-445, June, 1974. 6 fig, 3 tab, 8 ref.

Descriptors: *Urbanization, *Flood flow, *Watersheds(Basins), *Hydrographs, Hydrograph analysis, Model studies, Precipitation, Snowmelt, Infiltration, Retention, Seasonal, Storm runoff, *Michigan.

The effect of urbanization on flood flows is studied by analyzing inputs and corresponding flood hydrographs from many watersheds, along with corresponding inputs and responses from

watershed models. The inputs consist of precipitation plus snowmelt minus infiltration and retention. Because of the large seasonal variation in infiltration rates, accuracy was improved by treating rainfall frequencies seasonally in predicting flood runoff from precipitation and snowmelt. A procedure was also developed for including snowmelt with winter rains, and the resulting frequency curves of rain plus snowmelt are presented and compared with conventional rainfall frequency curves. It was shown, as example, that a large difference exists between typical winter and summer patterns in southeastern Michigan. (Sandoski-FIRL)
W74-13298

A MATHEMATICAL EXAMINATION OF URBAN RUN-OFF PREDICTION,
Institute of Hydrology, Wallingford (England).
S. G. Newton, and R. B. Painter.
Proceedings of the Institution of Civil Engineers, Vol 57, Part 2, p 143-157, March, 1974. 11 fig, 12 ref.

Descriptors: *Model studies, *Mathematical models, *Runoff, *Storm water, *Urban runoff, *Rational formula, Sewers, Storm drains.

A rigorous mathematical examination of the more frequently used methods of predicting urban runoff is given as a means of assessing their true limitations, and of indicating where improvements should be made. The study was prompted by the problem of prediction of the amount and distribution of storm runoff from impervious areas and subsequent modifications made in the pipe network. It was found that the rational formula for determining the peak runoff from a catchment allows for changes in storage in pipes and for variations with time of the rainfall. It can be generalized to give the discharge as a function of time. The area-time method allows for the variation in width of the catchment and the change in slope with position. (Murphy-FIRL)
W74-13449

RECIPROCAL INFLUENCE OF LARGE RESERVOIRS AND ADJACENT TERRITORIES IN DIFFERENT NATURAL CONDITIONS OF THE USSR,
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 5C.
W74-13466

4D. Watershed Protection

INTERRELATIONSHIPS BETWEEN QUANTITATIVE GEOMORPHIC CHARACTERISTICS OF THE DRAINAGE BASINS IN SUB-HUMID TO HUMID ENVIRONMENT OF RAJASTHAN,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 4A.
W74-13147

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

ECONOMICS OF INDUSTRIAL WASTE WATER SAMPLING,
N-CON Systems Co., Inc., New Rochelle, N.Y.
For primary bibliographic entry see Field 5D.
W74-12780

FIELD INVESTIGATIONS OF HEATED DISCHARGES FROM NUCLEAR POWER PLANTS ON LAKE MICHIGAN: 1972,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5B.
W74-12904

ECOLOGY AND ANALYSIS OF TRACE CONTAMINANTS, PROGRESS REPORT JUNE 1972-JANUARY 1973.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12905

DEVELOPMENT OF AN ENVIRONMENTAL UNIFIED TRANSPORT MODEL FOR TOXIC MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12906

ENVIRONMENTAL MONITORING OF TOXIC MATERIALS IN ECOSYSTEMS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12907

HYDROLYTIC BEHAVIOR OF TOXIC METALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12911

DEVELOPMENT OF HIGH SENSITIVITY X-RAY FLUORESCENCE FOR ANALYSIS OF TRACE TOXIC ELEMENTS,
Oak Ridge National Lab., Tenn.
C. J. Sparks, Jr., L. A. Harris, and O. B. Cavin.
In: Report No. ORNL-NSF-EATC-1, p 247-265, March 1973. 8 fig, 1 tab, 5 ref.

Descriptors: *Trace elements, *Analysis, *Analytical techniques, *X-ray fluorescence, *Toxins, Toxicity, Environment, Research and development, *Pollutant identification.
Identifiers: *Sensitivity, Geometrical arrangement.

Three new and different geometrical arrangements for x-ray fluorescent analyses (XRF) have been explored to determine their relative merits for improving the detectability of trace elements. As improvement in sensitivity increases, a reduction in the number of elements detected occurs so only one element at a time can be detected with maximum sensitivity. The ultimate detectability of trace elements with XRF is shown to depend on the inelastic scatter of the exciting radiation by the matrix. This inelastic scatter decreases with the average atomic number of the matrix favoring the kinds of samples of most interest to the environmentalist. However, the use of solid state detectors becomes less favorable and crystal analyzers more satisfactory for trace element determinations. With a judicious choice of the variables, detection of several elements at levels of a few parts per billion can be achieved without concentration or any prior treatment of the sample. (See also W74-12905) (Houser-ORNL)
W74-12912

ENVIRONMENTAL APPLICATIONS OF CENTRIFUGAL PHOTOMETRIC ANALYSIS,
Oak Ridge National Lab., Tenn.
G. Goldstein, J. L. Bowling, G. Goldberg, and M. T. Kelley.
In: Report No. ORNL-NSF-EATC-1, p 267-285, March 1973. 8 fig, 5 tab, 27 ref.

Descriptors: *Photometry, Analysis, *Analytical techniques, *Spectrophotometry, *Centrifugation, Environment, Evaluation, Kinetics, Computers, Computer programs, Data collections, Data processing, Research and development, Equipment, *Pollutant identification.

Investigations are reported for the use of the GeMSAEC Fast Analyzer for performing analyses of interest in evaluating environmental quality. Several kinds of photometric methods are adaptable to the GeMSAEC system; emphasis now is on reaction-rate methods, because they are usually simple and sensitive, and on spectrophotometry, because it is by far the most widely used method of analysis. Software development was completed which involved modification of the FOCAL language provided for the PDP-8 computer to allow data collection and data processing with a minimum hardware configuration. Procedures are being developed for the analysis of iodide, selenium, and copper by kinetic methods which it is anticipated will be faster, cheaper, and require fewer separations than conventional methods. A comparison of the GeMSAEC system with other spectrophotometers indicates that it is more precise than most general-purpose instruments, and with appropriate modification could achieve a relative error of less than 0.1%. (See also W74-12905) (Houser-ORNL)
W74-12913

SEPARATION, DETECTION, AND IDENTIFICATION OF ORGANICALLY BOUND TOXIC METALS AND OTHER HAZARDOUS MATERIALS,
Oak Ridge National Lab., Tenn.
Y. Talmi, and R. Crosmun.
In: Report No. ORNL-NSF-EATC-1, p 287-307, March 1973. 7 fig, 6 tab, 10 ref.

Descriptors: Analysis, *Metals, *Toxins, *Toxicity, *Analytical techniques, Research and development, *Gas chromatography, *Mercury, Halides, Chlorides, Water, Springs, Evaluation, *Pollutant identification.

Design and construction are reported of an analytical system utilizing gas chromatography and plasma (microwave) emission spectrometric detection. The system has been optimized and its utilization to develop analytical procedures for organomercurials has begun. Methyl-, ethyl-, and methoxy-ethyl mercury halides have been separated on the GC column and detected at the picogram level. The determination of methylmercury chloride in water, spring water, and freeze-dried fish has been studied, and analytical procedures have been established. Recovery of the methylmercuric chloride from these samples was at the 96-103% range, thus ensuring the accuracy of the analysis. The adequate accuracy was also demonstrated by the good agreement between these results and those obtained by 'total mercury' techniques such as atomic absorption and NAA. Reproducibility, defined as relative standard deviation, is at the 1-6% range. The technique is substantially faster and simpler than most others presently available. (See also W74-12905) (Houser-ORNL)
W74-12914

MEASUREMENT OF MOLECULAR ORGANIC CONTAMINANTS IN POLLUTED WATER,
Oak Ridge National Lab., Tenn.
W. W. Pitt, Jr., and C. D. Scott.
In: Report No. ORNL-NSF-EATC-1, p 309-331, March 1973. 3 fig, 4 tab, 25 ref.

Descriptors: Analysis, *Chromatography, *Analytical techniques, Research and development, *Anion exchange, *Organic matter, Water pollution, Absorption, Effluents, Sewage, *Pollutant identification.

High-resolution, anion-exchange chromatography is being applied to the problem of identifying and quantifying individual trace organic compounds present in various natural waters. The chromato-

aphic system which is being used is capable of alyzing for over 150 ultraviolet absorbing com-unds and/or compounds oxidizable with lfatoceric acid. Six sampling sites have been osen, and samples from three have been col-ted, concentrated, and analyzed. Chromato-ams of the concentrated samples have contained to 30 significant peaks plus numerous smaller es indicating a need for a more efficient concen-tion procedure and/or higher concentration fac-. These results are being compared with those tained from the high resolution analysis of the ganic pollutants in the water effluents of sanita-sewage plants. (See also W74-12905) (Houser-RNL)
74-12915

APID N-15 ISOTOPIC-RATIO ANALYTICAL STEM FOR ENVIRONMENTAL SAMPLES,
k Ridge National Lab., Tenn.
A. Strehlow, R. Dahlman, and R. D. Ackley.
Report No. ORNL-NSF-EATC-1, p 333-347, rch 1973. 3 fig, 1 tab, 5 ref.

scriptors: *Sampling, Environment, Analysis, nalytical techniques, *Nitrogen, *Stable topes, Behavior, *Measurement, Hydrogen, ckel, Gases, Ammonia, Nitrogen compounds, search and development, *Pollutant identifica-n.
entifiers: *Pyrolysis.

rapid analytical system for measuring nitrogen d its isotopes is discussed. Such a system is eded in order to expand the use of the stable topes in studies of the behavior of nitrogen in environment. Based upon a consideration of mple requirements in terms of size, sensitivity, d accuracy, a system has been planned and par-lly constructed which is expected to provide asures of both total nitrogen and the 15N:14N io. The concept involves pyrolysis of samples in presence of hydrogen and a nickel catalyst. ring this reductive pyrolysis, the nitrogen in the mples produces ammonia mixed with other luced species. Design of a gas-handling system concentrate the product gases and to convert ammonia to molecular nitrogen is described. A ss spectrometer will be used to analyze for total rogen and nitrogen isotope ratio. (See also W74-905) (Houser-ORNL)
74-12916

OXIC MATERIALS INFORMATION CENTER VIRONMENTAL INFORMATION SYSTEMS FICE,
k Ridge National Lab., Tenn.
D. Copenhaver, and G. U. Ulrikson.
Report No. ORNL-NSF-EATC-1, p 409-423, rch 1973. 6 tab, 10 ref.

scriptors: *Metals, *Toxins, *Toxicity, ocumentation, *Data storage and retrieval, nformation retrieval, *Abstracts, *Information change, Data collections, Data processing, In-xing, Publications, Technical writing, Transla-ns, Classification, Reviews, Ecology.

e Toxic Materials Information Center (TMIC) s established as a project support center for the ology and Analysis of Trace Contaminants Pro-m (EATC). Its purpose is to systematize the in-mation activities of fourteen EATC task groups h regard to acquisition, storage, retrieval, and semination of data. TMIC also serves as an in-mal link between EATC task groups and exter-groups with similar interests. Pertinent infor-tion on toxic materials in the environment, with rticular emphasis on metals and organo-metallic mpounds, is cataloged, stored, and dis-minated through the facilities and services of IIC's parent organization, the Environmental ormation Systems Office (EISO). (See also 74-12905) (Houser-ORNL)
74-12920

DETERMINATION OF ORGANIC ACIDS OF LOW RELATIVE MOLECULAR MASS (C-1 TO C-4) IN DILUTE AQUEOUS SOLUTION,
Swedish Forest Products Research Lab., Stockholm.
P. O. Bethge, and K. Lindstroem.
The Analyst, Vol 99, No 1175, p 137-142, Feb 1974. 2 fig, 2 tab, 11 ref.

Descriptors: *Water analysis, *Analytical techniques, *Organic acids, *Pollutant identification, *Acidic water, Acids, Organic compounds, Gas chromatography, Chromatography, Water chemistry, Waste water(Pollution), Pulp wastes, Industrial wastes.
Identifiers: Esters.

An analytical procedure is described for determining trace concentrations of short-chain fatty acids and hydroxy acids in water and waste waters. Acids such as acetic, formic, propionic, butyric, glycolic, and lactic acids in concentrations as low as 0.00005 M can be detected by converting them to their tetra-n-butylammonium salts, concentrating to a syrupy consistency, dissolving in acetone, and reacting with benzyl bromide; the resulting benzyl esters are then separated and determined by gas-liquid chromatography. (Buchanan-IPC)
W74-12929

AN IMPROVED METHOD FOR DETERMINATION OF TRACE QUANTITIES OF PHENOLS IN NATURAL WATERS,
Canada Centre for Inland Waters, Burlington (Ontario).
B. K. Afghan, P. E. Belliveau, R. H. Larose, and J. F. Ryan.
Analytica Chimica Acta, Vol 71, No 2, p 355-366, August, 1974. 3 fig, 6 tab, 17 ref.

Descriptors: *Phenols, *Water analysis, *Pollutant identification, *Analytical techniques, Separation techniques, Fluorometry, Analysis, Storage, Protection, Biodegradation, Bacteria, Waste water(Pollution), Spectrophotometry, *Solvent extractions.
Identifiers: Cresols, Ultraviolet spectrophotometry.

A solvent extraction procedure for the separation and concentration of low levels of phenols is described. Phenols are extracted with n-butyl acetate of isoamyl acetate from natural waters and then back-extracted with NaOH solution. The final extract can be analyzed by the 4-aminoantipyrine, UV spectrophotometric and/or fluorometric methods. These methods have been evaluated in terms of sensitivity, selectivity, precision, accuracy, and ability to determine different phenolic compounds. The solvent extraction/fluorometric method was found to be the most sensitive and accurate for the determination of phenol and cresols; the detection limit is 0.1 microgram/liter for individual phenols. Samples are preserved by the addition of HCl and storage in glass bottles. The acid effectively kills bacteria which biodegrade phenols. (Witt-IPC)
W74-12930

THE BIOLOGICAL MEASUREMENT OF WATER QUALITY,
Institute of Paper Chemistry, Appleton, Wis. Div. of Industrial and Environmental Systems.
E. Zanella.
American Paper Industry, Vol 56, No 5, p 20-23, May 1974. 3 fig.

Descriptors: *Water pollution sources, *Monitoring, *Bioassay, *Water quality, Waste water(Pollution, *Pulp wastes, Water pollution, *Water pollution treatment, Water pollution effects, *Bioindicators, Aquatic life, Aquatic organisms, Effluents, Industrial wastes, Pulp and paper industry, Measurement, Standards, Insects, Discharge(Water), Pollution abatement, Surveys.

The monitoring of biological water quality is discussed, and the importance of high-quality water to the pulp and paper industry is emphasized. A useful tool in maintaining water quality standards is a biological audit that utilizes the structure and composition of various living aquatic communities for measuring changes in water quality. As an example, an unaltered stream was shown to contain immature May flies, caddis flies, and stone flies, whereas under severe waste loading conditions the same stream supported only hardy worms, midge larvae, and leeches. Such biological studies can be used also to detect and monitor the effectiveness of antipollution treatments. Such biological surveys of streams polluted by pulp and paper mill discharges generally follow a certain format. This is described in some detail, including modifications needed under special conditions. (Wise-IPC)
W74-12932

THE CHARACTERIZATION OF SPENT ALKALI/OXYGEN BLEACHING LIQUOR,
State University of New York, Syracuse. Coll. of Environmental Science and Forestry.
E. Scholander, W. B. Durst, G. Pearce, and C. W. Dence.
Tappi, Vol 57, No 3, p 142-145, March 1974. 1 fig, 5 tab, 27 ref.

Descriptors: *Pollutant identification, *Water pollution sources, *Bleaching wastes, *Pulp wastes, Chromatography, Carbohydrates, Phenols, Oxygen, Lignins, Oxygenation, Organic compounds, Alcohols, Organic acids, Pollutants, *Waste identification, Industrial wastes.
Identifiers: Oxygen bleaching, Kraft pulp, Vanillin, Aldehydes, Ketones, Acetone.

Gas and thin-layer chromatographic analysis was used to characterize the solids in a sample of spent liquor from the bleaching of kraft pulp with oxygen and alkali. Methyl alcohol was the principal neutral constituent. Acetone and acetaldehyde were present in much smaller amounts. Phenolic compounds detected included vanillin and vanillic acid in nearly equal concentrations, and a small though significant amount of acetoguaiacone. Acetic and formic acids in 1:4 ratio were present in significant quantities. Carbon dioxide (as sodium carbonate) amounted to 1% of the oven-dry weight of the pulp, and was the most abundant constituent of the spent liquor. The nonvolatile acid fraction (oxalic, malonic, maleic, fumaric, malic, succinic, and citraconic acids, among others) appears to stem largely from lignin degradation products. The acid hydrolyzate of liquor solids showed the presence of D-galactose, D-glucose, and D-mannose. Acidic degradation products of carbohydrates included D-gluconic, D-mannonic, D-xylonic, L-arabinic, D-erythronic, glucoisosaccharinic, metasaccharinic, lactic, glyceric, glycolic, and dihydroxybutyric acids. The neutral plus acid sugar fragments accounted for ca. 9% of the total organic solids in the liquor. (Witt-IPC)
W74-12943

A REVIEW OF THE BIOCHEMICAL OXYGEN DEMAND (BOD-5) TEST,
Beak Consultants Ltd., Toronto (Ontario).
P. J. Leblanc.
Pulp and Paper Magazine of Canada, Vol 75, No 3, p 79-84, Technical Paper T85, March 1974. 9 fig, 19 ref.

Descriptors: *Biochemical oxygen demand, *Organic loading, *Waste water(Pollution), *Water analysis, *Analytical techniques, Industrial wastes, Liquid wastes, Water pollution effects, Pulp wastes, Water pollution sources, Biodegradation, Microorganisms, Effluents, Oxidation, Standards, *Pollutant identification.

The five-day conventional BOD test for evaluation of pollution loads in waste waters is reviewed, in-

cluding its historical background, significance, kinetics, precision, reliability, microbiological aspects, influential variables, accelerated determination methods, and sample preparation techniques. (Buchanan-IPC)
W74-12947

EVALUATION OF A METHOD PRESENTLY USED FOR DETERMINING SUSPENDED SOLIDS IN EFFLUENTS FROM PRODUCTION OF FIBER BUILDING BOARDS (OCENA STOSOWANEJ OBECNIE METODY OZNACZANIA ZAWIESINY W SZIEKACH OTRZYMYWANYCH PRZY PRODUKCJI PLYT PILSNIOWYCH),
Akademia Rolniczej, Warsaw (Poland). Instytut Technologii Drzewnicktwa.
W. Onisko, and A. Cymbarewicz.
Przeglad Papierniczy, Vol 30, No 2, p 51-55, Feb 1974. 5 tab, 12 ref. (English summary).

Descriptors: Water analysis, *Suspended solids, Waste water(Pollution), *Monitoring, *Analytical techniques, *Pulp wastes, *Filtration, *Gravimetric analysis, Filters, Europe, Pulp and paper industry, Effluents, Colloids, *Pollutant identification, Electrolytes, Temperatures, Hydrogen ion concentration, Industrial wastes.
Identifiers: Poland, Building boards, Insulation boards, Paperboards, Hardboards.

Suspended solids in waste waters from fiber building board factories in Poland are presently determined by passing a sample through filter paper and drying and weighing the filter cake. Although the method is simple, its time requirements vary widely, and the reproducibility of results is poor. These disadvantages were traced largely to the presence of colloids which are retained on the filter along with suspended solids. Other factors contributing to the wide scatter of results are accidental impurities and large particles originating from woody raw material, the variable porosity of the filter paper used, and the varied characteristics of effluents, such as pH, temperature, and electrolyte content. Discontinuation of this method and development of better procedures are recommended. (Stapinski-IPC)
W74-12948

AN ION-EXCHANGER/EPOXY RESIN PELLETIZATION METHOD FOR SAMPLE PREPARATION IN X-RAY FLUORESCENCE ANALYSIS. MICROANALYSIS OF METAL IONS IN INDUSTRIAL WASTE WATER,
Murata Manufacturing Co. Ltd., Nagoka (Japan).
M. Murata, and M. Noguchi.
Analytica Chimica Acta, Vol 71, No 2, p 295-302, August, 1974. 4 fig, 6 tab, 4 ref.

Descriptors: *Water analysis, *X-ray fluorescence, *Metals, *Waste water(Pollution), *Pollutant identification, Manganese, Iron, Nickel, Copper, Zinc, Strontium, Lead, Chemical analysis, Epoxy resins, Binders, Ion exchange, Industrial wastes, Analytical techniques, Fluorescence, X-ray analysis, Non-destructive tests, Heavy metals, Cations.
Identifiers: *Sample preparation, Barium, Bismuth, Trace analysis.

A pelletization procedure with epoxy resin as a binder for ion-exchange resin has been developed for sample preparation in x-ray fluorescence analysis. This new technique is applied to microanalysis of Mn, Fe, Ni, Cu, Zn, Sr, Ba, Pb, and Bi in industrial waste waters. The pellets prepared by the proposed procedure are stable and permit high sensitivity and good reproducibility to be achieved. Detection limits of Mn, Fe, Ni, Cu, Zn, Sr, Ba, Pb, and Bi based on a 500 ml sample solution are 0.015, 0.012, 0.005, 0.008, 0.004, 0.009, 0.29, 0.017, and 0.020 ppm, respectively. (Witt-IPC)
W74-12953

GAS-CHROMATOGRAPHIC DETERMINATION OF HYDROGEN SULFIDE IN AQUEOUS SOLUTIONS (GAZO-KHROMATOGRAFICHESKOE OPREDELENIE SEROVODORODA V VODNYKH RAZTVORAKH),
Leningrad State Univ. (USSR); and Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshlennosti, Leningrad (USSR).
I. L. Butaeva, V. V. Tsibulskii, A. G. Vitenberg, and M. D. Inshakov.
Zhurnal Analiticheskoi Khimii, Vol 28, No 2, p 337-340, Feb 1973. 2 fig, 1 tab, 11 ref. (English summary).

Descriptors: *Water analysis, *Sulfides, *Hydrogen sulfide, *Sulfur compounds, *Analytical techniques, *Pollutant identification, *Industrial wastes, *Chemical wastes, Waste water(Pollution), *Gas chromatography, Chromatography, Thermal conductivity.

A newly developed method is described by which small amounts (down to 1 mg/liter) of hydrogen sulfide can be determined in waters and waste waters with an accuracy of better than 10%, using a gas chromatograph in conjunction with a thermal conductivity detector. (Chern-IPC)
W74-12962

DETERMINATION OF PHENOLS IN EFFLUENTS BY VOLTAMMETRY (OPREDELENIE FENOLOV V STOKAKH VOL'TAMPEROMETRICHESKIM METODOM),
Tsentralnyi Nauchno-Issledovatelski Lesokhimicheski Institut, Khimki (USSR).
Yu. V. Vodzinskii, V. V. Budylina, and I. A. Korshunov.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', No 1, p 7-9, 1974. 1 fig, 3 tab, 7 ref.

Descriptors: *Water analyses, *Analytical techniques, *Phenols, *Polarographic analysis, *Pollutant identification, *Industrial wastes, Waste water(Pollution), *Chemical wastes, Wood wastes, Lignins, Effluents, Foreign research.
Identifiers: USSR, Wood pyrolysis, Silvichemicals.

Phenolic compounds oxidized on a graphic electrode generate a current proportional to their concentration, regardless of the nature, number, or position of substituents in the molecule. A polarographic method based on this finding was developed, using a graphite electrode and a Cd/Cd sulfate reference electrode, and applied to the analysis of effluents from chemical wood-processing factories. Such effluents were found, by gas-liquid chromatography, to contain 30-50% phenol and alkylated phenols, 10-25% of 2,6-dimethoxy-phenol and its para-alkyl derivatives, 15-28% guaiacol and derivatives, and 12-40% pyrocatechol and p-alkylated derivatives. A linear relationship was observed between the limiting current and the concentration of a phenol mixture (resembling wood pyrolyzates), suggesting that a standard solution can be used for determining total phenols in mill effluents. For dilute (below 0.1 mg/liter) and concentrated (over 1 mg/liter) phenol solutions, two separate polarographic procedures were developed, in which differential or integral current-potential curves are recorded, respectively. The method is sensitive down to 0.01 mg of phenol per liter, requires about 30 min for a determination, and is unaffected by the presence of low-molecular carboxylic acids, alcohols, esters, aldehydes, or ketones. Results agreed with colorimetric phenol analyses. (Stapinski-IPC)
W74-12964

PRODUCTION AND RELEASE OF RADIOACTIVE KRYPTON- AND XENON-ISOTOPES BY NUCLEAR POWER PLANTS AND REPROCESSING PLANTS AND THE EXPECTED RADIOLOGICAL BURDEN TILL THE YEAR 2000, (ERZEUGUNG UND FREISETZUNG VON RADIOAKTIVEN KRYPTON- UND XENON-ISOTOPEN DURCH KERNREAK TOREN UND WIEDERAUFARBEITUNG SAN LAGEN UND DIE VORAUSSICHTLICH RADIOLOGISCHE BELASTUNG BIS ZUI JAHR 2000),
Kernfurschungszantrum, Karlsruhe (West Ge many).
F. Hilbert.
Dissertation, April 1974. 197 p, 28 fig, 43 tab, 2 ref. English summary.

Descriptors: Radioactivity, Radioisotopes, Kryp ton, Xenon, Productivity, Nuclear powerplant Nuclear reactors, Fuels, Effluents, Nuclear expl sions, Evaluation, Safety assessment, Degrad tion, Regulation, Forecasting, Projections, A pollution, Water pollution.
Identifiers: Fuel reprocessing, Weapons testin Release rates, Atmospheric concentration, Dos calculation.

The natural production of radioactive Krypto and Xenon-isotopes is summarized together wi the yields from nuclear facilities and nucle weapons tests. Specific production rates in nucle power reactors are calculated. The activity flow in the different plants are described and the co sequent release rates, representative of time a evaluated. Estimated release rates from 1500 t/a fuel reprocessing plants are included. With th condition that a dose of 30 mrem/a should not b exceeded for any release, the requisite minimu decontamination factors and cooling times a specified. Based on the forecasted growth nuclear facilities till the year 2000, the time depe dent global concentrations and radiation dos from Kr-85-releases are calculated using differe atmospheric models. The effect of noble-g separation from the plant off-gas streams nuclear facilities on the exposure is investigate (Houser-ORNL)
W74-12971

LEAD IN THE CALIFORNIA SEA LIO (ZALOPHUS CALIFORNIANUS),
Ohio State Univ., Columbus. Environment Biology Program.
For primary bibliographic entry see Field 5C.
W74-12973

MIREX: AN UNRECOGNIZED CONTAMINAN OF FISHES FROM LAKE ONTARIO,
Canada Centre for Inland Waters, Burlingto (Ontario).
K. L. E. Kaiser.
Science, Vol 185, No 4150, p 523-524, Augu 1974. 2 tab, 15 ref.

Descriptors: *Chlorinated hydrocarbon pesticide *Polychlorinated biphenyls, *Lake Ontario, *Fis Chromatography, Insecticides, Pesticide *Canada, *Pollutant identification.
Identifiers: Mirex, *Bay of Quinte(Lake Ontario)

A perchlorinated, cage-structured hydrocarbo $C_{10}Cl_{12}$, also known as mirex or Dechlorane, h been identified in fish samples from the Bay Quinte, Lake Ontario, Canada. The compoun coelutes with polychlorinated biphenyls (PCB's) residue cleanup procedures and under standa gas chromatographic conditions. Mirex has nev been registered for use as an insecticide Canada, nor does it appear to be in use in any ar of the United States discharging water into La Ontario or its tributaries. It seems likely, ther fore, that this compound may be anoth widespread environmental contaminant of e tremely high geochemical stability and as yet on superficially investigated biological activitie Under standard gas chromatographic conditio its peak is superimposed on that of t polychlorinated biphenyls, and, as a result, t presence of mirex may have been unrecognize and it may have been misinterpreted as polychlorinated biphenyl isomer. (Harmeso ISWS)
W74-12990

HE APPLICATION OF STATISTICAL ECHNIQUES TO RIVER QUALITY MANAGE-ENT,
ASAMS, Camberley (England).
. C. Oxley, and B. F. J. Wallis.
ater Pollution Control, Vol 73, No 4, p 449-455, 74. 3 fig, 20 ref.

escriptors: *Water quality control, Management, *Rivers, *Monitoring, *Statistical ethods, Hydrologic data, Pollutants, Effluents, andards, Reach(Streams), Stochastic processes, nmonia, Decision making, Systems analysis, quations, Mathematical models.
entifiers: *Thames River(Great Britain), Multiple regression analysis, Information.

he applicability of simple statistical techniques to ater quality management is discussed. The two ain areas in which this form of data analysis may ovide quantification for management decision e considered: (1) prediction of future levels of llutants in rivers for setting suitable standards; d (2) water quality monitoring systems to pro-de both day-to-day and long-term information r quality management. Statistical modeling cognizes the stochastic nature of those parame-rs affecting quality levels, while obviating the cessity for long-term research into causal in-ractive relationships. High ammonia concentra-ons inhibit the disinfection of water supply and ise costs of chlorination. To determine an op-num effluent standard to keep river concentra-ons at an acceptable level without incurring ex-ssive treatment costs, it is necessary to predict e fate of ammonia under different conditions ithin the system. A statistical model, based on ultiple regression analysis, has been developed predict ammonia concentrations in the Thames ver. The model uses hydrological and quality in-rmation collected by the Thames Conservancy 967-72) and demonstrates the applicability of atistical modeling to suitable data. Physical odeling provides a basis for economic models hich must precede expenditure to clean up pol-ted river systems if the maximum benefits are to obtained. (Bell-Cornell)
74-13024

ONLINEAR LEAST SQUARES TECHNIQUES OR SYSTEM IDENTIFICATION IN WATER UALITY,
olumbia Univ., New York. Dept. of Civil En-neering.
G. Beliveau, and G. Mattingly.
ournal of Environmental Systems, Vol 4, No 1, p -37, Spring 1974. 3 fig, 2 tab, 9 ref.

escriptors: *Water quality control, *Dissolved xygen, *Biochemical oxygen demand, Measurement, *Least squares method, *Model udies, Estimating, Standards, Statistical ethods, Simulation analysis, Rivers, Equations, ethodology, Systems analysis.
dentifiers: *Nonlinear programming, *Eigenvalue nalysis, *Parametric differentiation.

he method of nonlinear least squares combined ith eigenvalue perturbation and parametric dif-rentiation is shown to yield good estimates of ater quality parameters in the observation of ochemical oxygen demand (BOD) and the dis-olved oxygen (DO) deficit. Most models roposed to represent these experimental observa-ons are variations of the classical Streeter-Phelps quation for the oxygen-sag relationship in rivers. lore complicated models of stream water quality ould consider the system of partial differential quations resulting from the complete mass, mo-entum, and energy transport considerations. arious assumptions conveniently reduce these quations to simple relationships. The model resented considers such effects, and respective arameters, as sedimentation, photosynthesis, eaeration rate, runoff, and deoxygenation rate. oth numerically generated test cases and actual aboratory experiments are dealt with in this 'inverse' procedure. Considered are cases with both BOD and DO data and those with DO data only. These methods are applied to a simple model, but they may be used for more complicated models should the data require it; second order terms for decay rates could be considered and the effect of nitrification could be modeled, thus increasing the number of equations. (Bell-Cornell)
W74-13028

STUDIES ON THE CRUSTACEAN PLANKTON OF A FRESHWATER TANK AT PILANI, RAJASTHAN, (IN MALAYALAM)
Christ Coll., Irinjalakuda, (India).
For primary bibliographic entry see Field 5C.
W74-13031

MICROBIAL CO-OXIDATION OF HALOGENATED AROMATIC COMPOUNDS,
Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
For primary bibliographic entry see Field 5B.
W74-13057

HYDROCARBON COMPONENTS TO FLOATING OIL POLLUTANTS OF SEA WATER, (IN JAPANESE),
Shimadzu Seisakusho Ltd., Tokyo (Japan). Tokyo Research Lab.
M. Matsui, K. Watanabe, T. Yoshida, and T. Kawabata.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 40, No 1, p 111-116, January 1974. 6 fig, 1 tab, 6 ref. (English summary).

Descriptors: *Oil, *Pollutant identification, *Oil spills, Pollutants, Water pollution, Sources, Organic compounds, Oil pollution, Oil wastes, Laboratory tests, Analytical techniques, *Gas chromatography, Chemical analysis.
Identifiers: Tar-balls, Crude oil, Hydrocarbon components, Heavy oil.

The components of hydrocarbon pollutants in relation to the source and mechanism of formation of 'tar-balls' were investigated. The hydrocarbon compounds in C-class heavy oil, wasted lubricant and Iranian, Arabian and Minas crude oil samples were analyzed by gas chromatography. Then, each oil sample was floated in a test tank and allowed to settle on the surface of sea water for about four months. The n-paraffine components in each test sample were analyzed periodically. After standing for 400 hours, the hydrocarbon components in the C-class heavy oil, wasted lubricant, Iranian and Arabian crude oil became indistinguishable from one another, while the Minas crude oil was distinctive from other oil samples. The n-paraffine components in tar-balls collected around the Hachijo and Okinawa Islands were analyzed by gas chromatography, and the source and mechanism of formation of such types of solid or semi-solid pollutants were discussed. (Katz)
W74-13075

STUDY OF MEANS OF AUTOMATICALLY CLASSIFYING PLANKTON,
Massachusetts Inst. of Tech., Cambridge.
L. L. Sutro.
Available from the National Technical Information Service, Springfield, Va. 22161 as COM-74-10716; $3.25 in paper copy, $2.25 in microfiche. Massachusetts Institute of Technology Sea Grant Program Report, No MIT-SG 74-11, Index No 74-311-Vlk, January 1974. 25 p, 8 fig, 35 ref.

Descriptors: Technology, *Equipment, *Design, *Plankton, *Classification, Methodology, Systematics, Commercial fishing, Analytical techniques, Gas chromatography, Spectroscopy.
Identifiers: *Sensors, *Automatic recognizer, DNA, Cybernetic design.

Three possible ways of classifying zooplankton chemically are investigated. Classification by DNA is slow and expensive. Mass spectroscopy and gas chromatography of ground, pyrolysed samples, is unreliable. A third method of analyzing the hydrocarbons of stomach, gut and liver has been applied only to large sea animals. Devices to facilitate the work of human sorters are suggested. These include: a stereo-TV-computer that forms a three-dimensional model; gimballed stereo TV cameras that can look around, as human eyes do, with a high resolution central view; solid state sensor arrays to transduce the image; and fast, small and inexpensive computer components. (Katz)
W74-13078

A DIRECT ESTIMATION OF MICROGRAM AMOUNTS OF AMMONIA IN WATER WITHOUT SALT-ERROR,
Tokyo Univ. (Japan). Fisheries Inst.
Y. Nimura.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 39, No 12, p 1315-1324, December 1973. 2 fig, 8 tab, 22 ref.

Descriptors: *Ammonia, *Nitrogen compounds, *Water analysis, *Methodology, *Chemical analysis, Water quality control, Analytical techniques, Colorimetry, Volumetric analysis, Sea water, Salinity, Chemistry, Chlorine, Laboratory tests, Amino acids, Pollutant identification.
Identifiers: *Beer's Law.

A direct colorimetric method has been developed for the determination of ammonia in water without salt-error by using the phenol-hypochlorite reaction. As a large amount of potassium carbonate was added to make the condition of indophenol blue formation nearly constant without regard for the salinity of samples, the method could be made free of salt-error in the determination of samples of either fresh or sea water whose chlorinity was less than 28 parts per thousand. Twenty-five inorganic and thirty-eight organic compounds, including twenty-one L-amino acids, were tested for interference, and little interference was observed in the not strongly polluted samples. (Katz)
W74-13084

SOME HEAVY METALS IN SPRAT (SPRATTUS SPRATTUS) AND HERRING (CLUPEA HARENGUS) FROM THE INNER OSLOFJORD),
Oslo Univ. (Norway). Lab. for Marine Zoology and Marine Chemistry.
For primary bibliographic entry see Field 5C.
W74-13089

THE USEFULNESS OF BIOLOGICAL TESTS FOR DETERMINING THE TOXICITY OF SOME CHEMICAL COMPOUNDS IN WATERS,
Wroclaw Technical Univ. (Poland). Zaklad Biologii Sanitarnej.
For primary bibliographic entry see Field 5C.
W74-13097

METHODS FOR THE DETECTION OF CERTAIN PATHOGENS OF SALMONID FISHES,
Department of the Environment, Winnipeg (Manitoba). Fisheries and Marine Services.
D. C. Gillespie, T. P. T. Evelyn, C. Frantsi, R. M. Mac Kelvie, and N. Neufeld.
Fisheries Research Board of Canada, Miscellaneous Special Publication, No 23, 1974. 10 p, 2 tab, 10 ref.

Descriptors: Methodology, *Salmonids, Fish, Freshwater fish, *Fish diseases, Fish parasites, *Pathogenic bacteria, Laboratory tests, Bacteria, Myxobacteria, Protozoa, Fish hatcheries, Pollutant identification, Water pollution effects.
Identifiers: Autopsy procedures, Disease detection, Fish culture.

Laboratory methods for an integrated step-by-step procedure for handling fish samples to test for major bacterial, viral and myxosporidian pathogens of salmonids are presented. Except for certain situations involving the lethal sampling of wild spawners, the sampling procedures are based on the probability, at the 95% level of confidence, of detecting a disease agent carrier. Composition, transportation and laboratory handling of the samples are described in detail. The methods provide for the detection of pathogens that are divided into two groups, based on degree of ubiquity. Pathogens in the more widespread group are the myxobacteria, motile aeromonads, pseudomonads and the vibrios; identification to the species level is not required for these organisms. Pathogens in the less ubiquitous group are the kidney disease bacterium, redmouth bacterium (Enterobacteriaceae), Haemophilus piscium, Aeromonas salmonicida, the protozoans Myxosoma cerebralis, and Ceratomyxa shasta, and several viruses. (Katz)
W74-13100

STUDIES ON THE INFLUENCE OF PCB ON AQUATIC ORGANISMS-III. RELATIONSHIP BETWEEN THE INTAKE OF PCB AND ITS ACCUMULATION IN VARIOUS TISSUES OF CARP (IN JAPANESE),
Tokai Univ., Shizuoka (Japan). Women's Coll.
For primary bibliographic entry see Field 5C.
W74-13104

CALCULATIONS OF DOSE, POPULATION DOSE AND HEALTH EFFECTS DUE TO BOILING WATER NUCLEAR POWER REACTOR RADIONUCLIDE EMISSIONS IN THE UNITED STATES DURING 1971,
Office of Radiation Programs, Washington, D.C.
J. A. Martin, and C. B. Nelson.
Radiation Data and Reports, Vol 15, No 6, p 309-319, June 1974. 9 fig, 7 tab, 19 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Assay, *Assessment, *Population, Public health, Measurement, Safety, Fuels, Radioactivity, Meteorology, Krypton, Rubidium, Xenon.
Identifiers: *Dose, *Fuel reprocessing.

Atmospheric emissions of radionuclides during 1971 reported by operators of 10 boiling water nuclear power reactors in the United States were analyzed to calculate resulting doses in the general offsite environment. A recently developed computer program (AIREM) was used to perform the calculations. A sector-averaged diffusion equation, using facility generated onsite annual average meteorology, was used to propagate the emission from the release point out to 80 kilometers. In 1971, 3.2 million curies of radioactivity were released to the atmosphere from 10 reactors. The resulting whole body population dose was calculated to be 900 person-rem. The health effects associated with this population dose were calculated to be small fractions of those induced by natural background radiation. Krypton, Rubidium, and Xenon were the major contributors to cloud gamma population doses. (Houser-ORNL)
W74-13110

RADIATION DATA-WATER.
Office of Radiation Programs, Washington, D.C.
Radiation Data and Reports, Vol 15, No 6, p 333-345, June 1974. 5 fig, 7 tab, 8 ref.

Descriptors: *Monitoring, *Sampling, *Analytical techniques, *Assay, *Radioactivity, *Water pollution, Groundwater, Water pollution treatment, Water quality, Surface waters, Water quality standards, Domestic water, New York, Tritium, Strontium, Drinking water.
Identifiers: *Surveillance program, Gross beta.

Data are provided by Federal, state, and foreign governmental agencies and other cooperating organizations. Data reported are accumulated from surveillance programs concerning radionuclide concentrations of surface, ground, and treated water. Most of the analytical determinations are for gross beta and gross alpha radioactivity. These values are compared with the Public Health Service Drinking Water Standards. Radioactivity in New York State Surface Water from January-December 1972 is reported. Separate tables give gross beta, strontium, and tritium concentrations. (Houser-ORNL)
W74-13111

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE QUAD-CITIES STATION, CORDOVA, ILLINOIS, JULY 1968.
EG and G, Inc., Las Vegas, Nev.
Available from NTIS, Springfield, Va 22161 as ARMS-68-6-6. $3.25/copy, $2.25/microfiche. Atomic Energy Commission Report No ARMS-68-6-6, June 1974. 18 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Monitoring, *Nuclear powerplants, Effluents, *Surveys, *Radioactivity, Background radiation, Nuclear wastes, Remote sensing, Data collections, Data processing, Public health, Regulation, *Illinois.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Quad-Cities Station during July 1968, prior to reactor start-up. The survey measured terrestrial background gamma radiation with special emphasis given to instrumentation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of a 625 square mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background. (Houser-ORNL)
W74-13112

ENVIRONMENTAL MONITORING AT ARGONNE NATIONAL LABORATORY: ANNUAL REPORT FOR 1973,
Argonne National Lab., Ill. Occupational Health and Safety Div.
For primary bibliographic entry see Field 5B.
W74-13114

AN INVESTIGATION OF THE MINERALOGY AND PETROGRAPHY OF URANIUM-BEARING SHALES,
Pennsylvania State Univ., University Park. Dept. of Mineralogy and Petrography.
For primary bibliographic entry see Field 2K.
W74-13116

HOURLY AVERAGE CONCENTRATIONS OF POLLUTANTS DUE TO POINT EMISSIONS NEAR TO THE GROUND - A PROBABILISTIC APPROACH,
Commissariat a l'Energie Atomique, Paris (France).
R. LeQuinio.
Available from NTIS, Springfield, Va 22161 as AECL-4501; $3.25/copy, $2.25/microfiche. Atomic Energy of Canada Limited Report No AECL-4501, March 1973. 8 p, 4 fig, 6 ref. Translated from paper SM-169/14 presented at the International Atomic Energy Agency Symposium on the Principles and Standards of Reactor Safety, Julich, Federal Republic of Germany, 5-9 February 1973.

Descriptors: *Radioactivity, *Nuclear reactors, *Effluents, *Monitoring, *Air pollution, Diffusion, Dispersion, Meteorology, Measurement, Biology, Biodegradation, Environmental gradient, Ecosystems, Food chains, Public health, Absorption, Canada.
Identifiers: Concentration, *Dose measurement, *France.

Several hundred atmospheric diffusion exp
ments were carried out during the past ten years
different sites in France. For sources close to
ground (0 to 50 m) the values of the maximum c
centrations at 2.5 km and 11 km have log-norm
distributions with essentially the same stand
deviations. The probability that predetermin
concentrations will be exceeded is a dedu
directly from these laws and not by means of
proximately representative calculations. T
median values and the distribution vary from
site to another. In particular the number of exc
tionally unfavorable situations is also proba
very variable depending on time and place.
study of the site ought to provide information
preferential plume trajectories. Two other iss
remain almost entirely unresolved as much for
average values as for the dispersion: (1) the eff
of the height of the release, and (2) the effect
the duration of the release and of the exposu
(Houser-ORNL)
W74-13124

**USE OF GAS CHROMATOGRAPHY IN T
ANALYSIS OF PHENYL-SUBSTITUT
RESIDUES OF UREA DERIVATIVES, (IN RU
SIAN),**
D. B. Girenko, and M. A. Klisenko.
Vopr Pitan, Vol 31, No 5, p 89-91. 1972, Illus.
Identifiers: *Gas, Chromatography, Diuron, H
bicides, Kotoran, Linuron, Monolinuron, Mo
ron, Neburon, Patoran, Phenyl, Potato
Residues, Tenoran, *Urea derivitives, *Pollut
identification.

Procedures and optimal conditions are describ
The eluting characteristics of diuron, linur
monuron, gotoran, neburon, monolinur
Tenoran and Patoran are presented. Diuron
determined in potatoes and linuron, monuron
diuron in water and air.--Copyright 1974, Biol
cal Abstracts, Inc.
W74-13126

**DETERMINATION OF CHEMICAL OXYG
DEMAND INDICES IN WATER, (IN RUSSIAN
I. M. Kutyrin, and Yu. P. Belichenko.
Gig Sanit. Vol 37, No 9, p 99-100. 1972.
Identifiers: Rivers, Sewage, *Chemical oxygen
mand, Biochemical oxygen demand, Pollut
identification.

Values for biochemical and chemical oxygen
mand in different portions of Soviet rivers
listed. These indices may be used to analyze
amount of organic substances in treated sew
water.--Copyright 1974, Biological Abstracts, In
W74-13130

**DETERMINATION OF TRITIUM IN WAS
PROCESSING EFFLUENTS BY DISTILLATI
AND LIQUID SCINTILLATION EMULSI
COUNTING,**
Atlantic Richfield Hanford Co., Richland, Wa
Manufacturing and Waste Management Div.
R. A. Hamilton.
Available from NTIS, Springfield, Va 22161
ARH-SA-188, $3.25/copy, $2.25/microfiche.
port No ARH-SA-188, April 1974. 24 p, 2 fig
tab, 8 ref, append.

Descriptors: *Management, *Nuclear wast
*Waste disposal, *Waste treatment, *Tritiu
Analysis, Analytical techniques, Environme
Effluents, Nuclear powerplants, Separat
techniques, Waste storage, Public hea
*Pollutant identification.

As part of Atlantic Richfield Hanford Compan
nuclear waste management program at Hanfo
moderate to low levels of tritium must be analyz
in steam and process condensates containing co
parable or higher levels of several other fiss
products to assure that any releases to the envir
ment are minimal and pose no danger to the pub

odified distillation cleanup procedure has been loped that will completely separate aqueous m samples from twelve radioactive isotopes monly found in aged fission products mix-. An emulsion type of liquid scintillation tail is used to incorporate a relatively large me of the aqueous sample and maintain a triti- counting efficiency normal in excess of 20%. ser-ORNL)
-13134

TOSPIRES FROM WATER SOURCES AT ON SPRINGS AGRICULTURAL CENTER,
ois Univ., Urbana. Coll. of Veterinary icine.
. Tripathy, and L. E. Hanson.
dl Dis. Vol 9, No 3, p 209-212. 1973.

criptors: *Illinois, Water pollution, Pollutants, ases, *Animal diseases, *Pollutant identifica-

tifiers: Gerbils, Hamsters, *Leptospires.

ospiral isolations (56) were made from 101 r samples (thought to be a vehicle of transmis- of leptospires to animals or vice versa) col- d from water sources on a 2020 ha semi- ded area in southern Illinois. Although 4 iso- reacted with standard antisera against several ogenic serotypes, none was able to produce in either gerbils or hamsters.--Copyright Biological Abstracts, Inc.
-13160

LICATION OF RED-LEAD TO THE DE- TION OF DISSOLVED SULFIDE IN TERLOGGED SOILS,
ersidade Federal da Bahia, Salvador (Brazil). of Geosciences.
primary bibliographic entry see Field 2G.
-13161

ELOPMENT OF A FLOATING OIL SLICK ECTOR.
Research Co., San Mateo, Calif.
. Kriebel.
lable from NTIS, Springfield, Va 22161 as 777 023, Price $5.75 printed copy; $2.25 ofiche. Coast Guard Office of Research and elopment, Final Report No CG-D-42-74, ember 1973. 126 p, 104 fig, 3 tab.

criptors: *Oil spills, *Pollutant identification, water, *Monitoring, *Instrumentation, pment, Oil pollution, Viscosity.
tifiers: *Oil-slick detector.

loating oil slick detector operates like a ometer, with a cylinder spinning inside a tly larger cylindrical shroud partially sub- ed in the water surface. An oil slick causes pinner to become coated with oil (rather than r) so that the shaft torque and the electrical ent through the drive motor both increase. The eased current can be used to close a relay and eby signal the presence of floating oil. Test reported include the recorded variations of r current for four types of oil, three oil slick nesses, and 10 different spinner-shroud con- ations. The effects of floating debris parti- debris filters, simulated wave motion, and rent spinner materials were also tested. The cts of submerging the detector, cycling it on off, and cycling it forward and reverse were studied to determine whether the correspond- ransients in the motor current might be used to ate the various types and thicknesses of oil s. Oil slicks are readily detected by most of spinner-shroud configurations, and there is a limited capability to discriminate the types hicknesses of oil slicks. (Knapp-USGS)
-13171

REGIONAL FLOW SYSTEM AND GROUND-WATER QUALITY IN WESTERN OHIO,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 4B.
W74-13181

RECONNAISSANCE STUDY OF SELECTED NUTRIENTS, PESTICIDES, AND TRACE ELEMENTS IN THE EEL, SALINAS, AND SANTA ANA RIVERS, CALIFORNIA, OCTOBER 1971 THROUGH JULY 1972,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 5B.
W74-13195

A MEMBRANE FILTRATION TECHNIQUE FOR THE ENUMERATION OF ESCHERICHIA COLI IN SEAWATER,
Ministry of Agriculture, Fisheries and Food. Burnham-on-Crouch (England). Fisheries Lab.
S. Halls, and P. A. Ayres.
Journal of Applied Bacteriology, Vol 37, No 1, p 105-109, 1974. 2 tab, 7 ref.

Descriptors: *Bacteria, *E. coli, *Sea water, *Filtration, Sewage, Pollution, Saline water, Fresh water, Laboratory tests, Monitoring, Coastal areas, Membranes, *Pollutant identification.
Identifiers: *Membrane filtration, *Fecal contamination, Enumeration.

Membrane filtration has become an accepted method for enumerating Escherichia coli in water, but little published evidence could be found to judge the specificity of the method to assess faecal contamination in either fresh or saline waters. A laboratory method was used to monitor the extent and degree of sewage pollution in coastal areas. There is still need for information on what proportion of lactose-fermenting colonies from seawater, developing at 44F on a 4 percent enriched Teepol medium, are E. coli type I. A total of 1352 colonies from seawater was tested for production of indole and for gas from lactose at 44F. In addition, 46 percent of the colonies were screened by the IMVEC series of tests. The proportion of colonies tested ranged from 10-100 percent, depending on the number of colonies on the membrane. Many of the colonies (81.9 percent) to which IMVEC tests were applied were E. coli type I; a further 10.9 percent were Irregular type I. (Prague-FIRL)
W74-13237

RAPID METHODS FOR THE DETERMINATION OF FAECAL CONTAMINATION IN OYSTERS,
New South Wales Univ., Kensington (Australia). Dept. of Food Technology.
R. B. Oadri, K. A. Buckle, and R. A. Edwards.
Journal of Applied Bacteriology, Vol 37, No 1, p 7-14, 1974. 6 tab, 15 ref.

Descriptors: *E. coli, *Incubation, *Laboratory tests, *Oysters, Contamination, Analytical techniques. Food, *Pollutant identification.
Identifiers: *Fecal coliforms, *Enteric pathogens, Most Probable Number method, MacConkey broth, Peptone water, Food poisoning.

The fact that food poisoning outbreaks are known to result from the consumption of fecally contaminated oysters makes it desirable that such products should be examined for enteric pathogens. Two methods for the rapid detection and estimation of numbers of fecal coliforms and Escherichia coli type I in oysters have been developed. That for fecal coliforms involves incubation of tubes of MacConkey broth for 2 h at 37F and then for 22-24 hours at 44F. The second method, a modification of MacKenzie, Taylor and Gilbert's (1948) specific method for E. coli type I, makes use of the same system of incubation, but requires the inoculation of tubes of peptone water as well as MacConkey broth, the former tubes being used for subsequent testing for indole formation. Both methods take only 24-26 hours and are as sensitive and accurate as the Most Probable Number methods which are in common use and which take upwards of 72-96 hours to complete. (Prague-FIRL)
W74-13238

SEPARATE DETERMINATION OF RESIDUAL AMOUNTS OF METHYLNITROPHOS IN APPLES AND WATER BY THE COLORIMETRIC METHOD, (IN RUSSIAN),
K. G. Novikova, and L. I. Leshchinskaya.
Gig Sanit. Vol 37, No 11, p 80-82, 1972. Illus.
Identifiers: Apples, Colorimetry, *Methylnitrophos, Pesticides, Residues,.

A method for the determination of the residues of isomers of methylnitrophos (0,0-dimethyl-0-(3-methyl-4-nitrophenyl)thiophosphate) (MNP) in apples and water in presented. The method involves extracting MNP with acetone and a redistribution from the water-acetone medium into chloroform. For sepatate determinations of the isomers additional operations are introduced. The methods of determining MNP in apples based on the sum of isomers and separately of microgram amounts of isomers of MNP in water are described.--Copyright 1973, Biological Abstracts, Inc.
W74-13239

SANITARY-VIROLOGICAL CHARACTERIZATION OF SEWAGE WATERS FROM SOME URBAN SEWAGE SYSTEMS IN THE UZBEK SSR, (IN RUSSIAN),
Uzbeksii Nauchno-Issledovatelskii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent (USSR).
L. E. Ergasheva, M. S. Artykov, and I. I. Ilinskii.
Gig Sanit. Vol 37, No 9, p 92-93, 1972.
Identifiers: *Coxsackievirus, *Echovirus, Enteroviruses, Hepatitis, Picornaviruses, *Poliovirus, Sewage, Viruses, *USSR(Uzbek), Wastewater treatment, Isolation, Pollutant identification.

The isolation of cytopathogenic agents, including enteroviruses (coxsackie virus, poliovirus and ECHO virus) from sewage systems in different cities from 1965-70 was analyzed. Treatment of water in humus tanks did not eliminate enteroviruses although biological purification and chlorination somewhat reduced the frequency. Analysis of sewage water was an appropriate method for sanitation control in The Uzbek SSR (USSR) and was recommended as a method for analyzing the distribution of hepatitis associated virus.--Copyright 1974, Biological Abstracts, Inc.
W74-13241

BOD MEASURING APPARATUS,
L. W. Fleischmann.
United States Patent 3,810,738. Issued May 14, 1974. Official Gazette of the United States Patent Office, Vol 922, No 2, p 573, May, 1974. 1 fig.

Descriptors: *Patents, *Biochemical oxygen demand, *Sampling, *Measurement, *Oxygen, Gas, Pressure, Waste water treatment, *Pollutant identification.
Identifiers: Closed loop gas passageway, Oxygen partial pressure sensor, Make-up gas.

The BOD of a waste water sample is measured by continuously recirculating an oxygen-containing gas through a closed loop gas passageway. The equipment is adapted to pass the gas in series through the waste water sample, a carbon dioxide absorber, and an oxygen partial pressure sensor. A make-up gas containing oxygen in a predetermined proportion is admitted to the closed loop passageway in an amount so that the oxygen partial pressure in the circulating gas remains constant. Inert gas in the make-up gas causes pressure in the system to build as additional oxygen is consumed. The BOD in a given sample is there fore in-

dicated by measuring the gas pressure in the closed loop passageway. (Prague-FIRL)
W74-13242

FLUID ANALYZER WITH VARIABLE LIGHT PATH,
Gam Rad, Inc., Detroit, Mich. (assignee)
For primary bibliographic entry see Field 7B.
W74-13252

TEMPERATURE-CONTROLLED FLUID MANIFOLD FOR A FLUID SYSTEM OF AN AUTOMATED SAMPLE ANALYZER,
Technicon Instruments Corp., Tarrytown, N.Y. (assignee)
For primary bibliographic entry see Field 7B.
W74-13258

LASER LIGHT SPOTS WATER POLLUTION.
Canadian Chemical Processing, Vol 58, No 4, p 31-32, April, 1974.

Descriptors: *Instrumentation, *Remote sensing, *Fluorometry, Water quality control, Application methods, Monitoring, Pollutant identification.

A remote sensing laser fluorometer device has been developed by the Inland Waters Directorate of Environment Canada. This insteument is able to detect specific substances at a distance, to operate at night, to perform well in bad weather, to monitor large areas from land, shipboard, or airborne platforms, and to run unattended for long periods. The entire system, including power supply, weighs 100 kilograms with about 600 watts of 120-volt AC required to run it. Considerable sophistication is required to interpret the readout of the instrument. Other than water quality monitoring, the laser fluorometer can be applied in looking for oil pipeline leaks and performing airborne forest health surveys. (Sandoski-FIRL)
W74-13278

BIO-DEGRADATION OF NON-IONIC SURFACTANTS-II: BIODEGRADATION ASSESSMENTS (BIODEGRADAZIONE DI TENSIOATTIVINON IONICI. NOTA 2: MISURE DELLA BIODEGRADAZIONE),
Montecantini Edison, Novara (Italy). Instituto di Richerche G. Donegani.
For primary bibliographic entry see Field 5B.
W74-13279

DETECTION OF DILUTE ORGANIC ACIDS IN WATER BY INELASTIC TUNNELING SPECTROSCOPY,
Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
Y. Skarlatos, R. C. Barker, G. L. Haller, and A. Yelon.
Surface Science, Vol 43, No 2, p 353-368, June, 1974. 9 fig, 2 tab, 14 ref.

Descriptors: *Water chemistry, *Analytical techniques, *Spectroscopy, *Organic acids, Application techniques, *Pollutant identification.
Identifiers: Inelastic electron tunneling spectroscopy.

Oxidized aluminum films were exposed to acetic, formic, and cynoacetic acid and covered with a lead film. These form junctions which carry electrical current by electron tunneling. The technique of inelastic electron tunneling spectroscopy, which reveals the characteristic vibration spectra of the molecules adsorbed on the oxide surface, was used to detect the presence of the organic molecules in the parts per million range. The intensity of the spectral lines, which is dependent upon the competition between water and the organic molecules for the adsorption sites on the alumina surface, appears to saturate in the 10 to 1000 ppm range. From the spectra obtained, one can distinguish between different molecules with similar structure and between different surface bonding configurations. The method should be applicable to the detection of low concentrations of other, similar organic molecules that adsorb readily on the alumina surface. (Sandoski-FIRL)
W74-13304

LEVELS OF MIREX AND SOME OTHER ORGANOCHLORINE RESIDUES IN SEAFOOD FROM ATLANTIC AND GULF COASTAL STATES,
Pacific Northwest Forest and Range Experiment Station, Corvallis, Oreg. Forestry Sciences Lab.
G. P. Markin, J. C. Hawthorne, H. L. Collins, and J. H. Ford.
Pesticides Monitoring Jornal, Vol 7, No 3/4, p 139-144, March, 1974. 1 fig, 2 tab, 9 ref.

Descriptors: *Pesticide residues, Oysters, Crabs, Shrimps, Fish, DDT, Polychlorinated biphenyls, Monitoring, Insecticides, Pollutant identification, Water pollution effects.
Identifiers: *Mirex, Organochlorine residue.

A monitoring program of seafood was established to detect mirex insecticide in 1971. Seventy-seven composite samples of oysters, crabs, shrimps, fish, and fish products were gathered from seven areas within a certain distance from where the mirex was being used. The data showed that only 9 out of the 77 samples showed an occurrence of mirppm range of 0.005-0.024, and that those nine originated around Savannah, Georgia. DDT was detected in 74 samples (0.002-2.475 ppm range). Aroclor 1260 occurred in 46 samples. This PCB residue might have been interpreted as mirex were it not for new cleanup methods. (Leibowitz-FIRL)
W74-13315

RESIDUES IN FISH, WILDLIFE, AND ESTUARIES,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5C.
W74-13317

WATER QUALITY CONSIDERATIONS IN PLANNING SMALL WATERSHEDS,
Soil Conservation Service, Jackson, Miss.
For primary bibliographic entry see Field 5G.
W74-13319

ACCUMULATION OF DIETARY POLYCHLORINATED BIPHENYLS (AROCLOR 1254) BY RAINBOW TROUT (SALMO GAIRDNERI),
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
For primary bibliographic entry see Field 5C.
W74-13321

THE WORK AND FACILITIES OF THE BRIXHAM LABORAORY OF IMPERIAL CHEMICAL INDUSTRIES LIMITED,
For primary bibliographic entry see Field 5D.
W74-13324

LIQUID SCINTILLATION COUNTING FOR PLUTONIUM IN ENVIRONMENTAL SAMPLES,
Dow Chemical Co., Golden, Col. Rocky Flats Div.
D. L. Bokowski.
American Industrial Hygiene Association Journal, Vol 35, No 6, p 33-344, June, 1974. 9 tab, 21 ref.

Descriptors: *Environmental control, Chromatography, Soil analysis, Pollutant identification, Path of pollutants.
Identifiers: *Plutonium, Liquid scintillation, Environmental samples.

A liquid scintillation counting technique which applicable to the conventional analysis of pluton um in environmental and biological samples discussed. A presentation is made of methods f improving the specificity and sensitivity for pl tonium. This method was compared to the anic exchange chromatography-alpha plus height spe trometry technique, and made valid by means of t-test. Procedures for saple preparation are give for air filters, water and soil. Expendiency preparation is shown. Overall mean recovery plutonium from the different types of samples w greater than 95 percent. Detectable activity at t minimum for 100-minute counts is 0.18 pC (Leibowitz-FIRL)
W74-13325

MONITORING 2,4-D RESIDUES AT LOX AHATCHEE NATIONAL WILDLIFE REFUGE,
Bureau of Sport Fisheries and Wildlife, War Springs, Ga. Southeastern Fish Control Lab.
D. P. Schultz, and E. W. Whitney.
Pesticides Monitoring Journal, Vol 7, No 3/4, 146-152, March, 1974. 4 tab, 11 ref.

Descriptors: *Herbicides, *Pesticide residue Water hyacinth, Fish, Sampling, Monitorin Water quality control, *Florida, *2-4-D, Polluta identification.
Identifiers: DTA-2-4-D, 2-4-D(DMA-2-4-D Florida gallinules, Boat-tailed grackle, Lo ahatchee National Forest(Fla).

In the Loxahatchee National Wildlife Refuge Florida, more than 7,000 acres along the Hillsbo perimeter canal were sprayed with 2,4-D(DT 2,4-D) at a rate of 4.48 kg acid equivalent per he tare to control water hyacinth (Eichornia cra sipes) in 1971. Samples of fish, water and m were collected at the three stations along the can for water quality monitoring and residue analysi The first application of 2,4-D, supported by sp treatments of DTA-2,4-D and/or t dimethylamine salt of 2,4-D (DMA-2,4-D) co trolled water hyacinth very well. The day after t initial treatment saw the highest residue level 2,4-D in water (0.037 mg/l). Three to 15 days aft treatment saw the highest occurrence of hydros (0.005 mg/kg). In 60 samples of fish, 3 showed he bicide residue exceeding 0.010 mg/kg, 16 show less than 0.010 mg/kg, and the remaining sampl appeared to be free of any noticeable residu Residue levels of 0.30 mg/kg and 0.675 were d tected in Florida gallinules a day after sprayin No bad effects were found to occur in the hatchi of boat-tailed grackle eggs or fledgling develo ment from herbicide use. (Leibowitz-FIRL)
W74-13326

A MULTIPURPOSE SPECTROFLUORIMETE FOR THE STUDY OF NATURAL AND CO TAMINATED WATER, (IN RUSSIAN),
Akademiya Meditsinskikh Nauk SSSR.
V. E. Sinelnikov, O. N. Timakhov, Yu. S. Inin, S V. Ikonnikova, and A. A. Gikkel.
Gig Sanit, Vol 38, No 1, p 65-68, 1973, Illus.
Identifiers: *Spectrofluorometers, *Polluta identification, Instrumentation, Measurement.

A single beam, recording spectrofluorimet model 'Akva-MF', suitable for operation in t visible and UV (250-800 nm) ranges for the anal sis of natural and polluted waters, is describe The instrument can be used for determining, o ganic and inorganic compounds, and for automat detection of fluorescent substances in water. Pol luminescence spectra can be studied by means o special adapter.--Copyright 1973, Biological A stracts, Inc.
W74-13358

AUTOMATIC DEVICES FOR SAMPLIN SEWAGE AND SURFACE WATER, (IN RU SIAN),
Permskii Politekhnicheskii Institut (USSR).
Ya. I. Vaisman, and V. D. Shatilin.

; Sanit, Vol 38, No 1, p 70-72, 1973, Illus.
ntifiers: *Sampling, *Sewage, Surface water, llutant identification.

automatic, water-wheel type sampler waste ter from sewer and canal shafts is described. e water wheel is driven by the water at flow es exceeding 0.1 m/sec. Another automatic, mp-equipped sampler, also suitable for sam- g water from water bodies, precludes con- ination of the samples with grease and oil used the pump by filling flasks placed on a horizon- rotary disk.--Copyright 1973, Biological Ab- cts, Inc.
4-13359

RUSES AND WATER: II. GENERAL REVIEW THE METHODS AVAILABLE TO DETECT RUSES IN WATER, (IN FRENCH),
ncy-1 Univ. (France). Laboratoire d'Hygiene et Recherche de la Sante Publique.
1. Foliguet, J. Lavillaureix, and L. wartzbrod.
Epidemiol Med Soc Sante Publique, Vol 21, 3, p 185-259, 1973. English summary.
ntifiers: *Pathogens, *Viruses, Reviews, llutant identification.

hnical aspects, applications and advantages of ommended techniques for the recovery of nogenic viruses from polluted water are erally reviewed.--Copyright 1974, Biological tracts, Inc.
4-13360

GIENIC PROBLEMS OF AUTOMATIC NITORING OF WATER QUALITY (BASED DATA OF THE WHO SEMINAR: KRAKOW: 1), (IN RUSSIAN),
chno-Issledovatelskii Institut Gigieny, scow (USSR).
. Strizhant.
Sanit, Vol 37, No 11, p 89-92, 1972.
ntifiers: *Monitoring, Poland, *Water pollu- , *Automation.

great practical value and urgency of introduc- automatic methods of checking water quality. h monitoring, in combination with measures ed at protecting bodies of water against pollu- , should be widely developed.--Copyright 4, Biological Abstracts, Inc.
4-13363

TERMINATION OF URANIUM IN NATURAL TERS AFTER ANION-EXCHANGE PARATION,
nna Univ. (Austria). Analsches Institut.
orkisch, and L. Godl.
lytica Chimica Acta, Vol 71, No 1, p 113-121, , 1974. 7 tab, 25 ref.

criptors: *Water analysis, *Uranium oisotopes, Freshwater, Trace elements, Anion hange, Fluorometry, Spectrophotometry, lytical techniques, *Separation techniques, n exchange, *Pollutant identification.
ntifiers: Uranium compounds.

ethod is described for the determination of U fluorometry and spectrophotometry in sam- of natural non-saline waters. After acidifica- with HCl, the water sample is filtered and, owing the addition of ascorbic acid and potassi- thiocyanate, passed through a basic anion- hange resin (Dowex 1-X8, thiocyanate form) mn. Uranium is adsorbed as an anionic thio- nate comples. After removal of iron and other dsorbed elements by washing first with a mix- of tetrahydro-furan, methyl glycol, and 6- ar HCl (50:40:10), and then with pure aqueous olar HCl, the U is eluted with 1-molar HCl. In eluate, U is determined fluorometrically or by ns of the spectrophotometric arsenazo III hod. The procedure was used for the routine determination of U in water samples collected in Austria. (Witt-IPC)
W74-13416

DETERMINATION OF AMMONIA LEVELS IN WATER AND WASTE WATER WITH AN AMMONIA PROBE,
Laboratory of the Government Chemist, London (England). Dept. of Trade and Industry.
W. H. Evans, and B. F. Partridge.
The Analyst, Vol 99, No 1179, p 367-375, June, 1974. 8 tab, 7 ref.

Descriptors: *Ammonium compounds, *Water analysis, *Analytical techniques, *Nitrogen compounds, *Instrumentation, *Pollutant identification, Waste water(Pollution), Ammonia, Freshwater, Lakes, Rivers, Swimming pools, Chlorine, Effluents, Industrial water.

An Electronic Instruments Ltd. model 8002-2 ammonia probe was used in the laboratory to measure the discrete free and saline ammoniacal nitrogen present in a wide range of water samples, including swimming-pool water, river and lake waters, industrial effluents, etc. Determination was possible within a precision of 4% for ammoniacal nitrogen levels greater than 0.4 mg/liter, and within 0.015 mg/liter for levels less than 0.4 mg/liter. Samples can be measured in random order, provided that consecutive readings involve absolute potential differences of not more than +60mv. Free chlorine interferes, owing to the presence of chloramines, but dechlorination is readily achieved with thiosulfate. The calculated lower limit of detection of 0.03 mg/liter of ammoniacal nitrogen and the precision at low levels (less than 0.1 mg/liter), which originates partly from the non-Nernstian response of the probe, suggest that accurate determination in potable water would be difficult. The probe can also be used to determine albuminoid nitrogen by taking the difference between the ammoniacal nitrogen and the total free ammoniacal plus albuminoid nitrogen obtained by distillation. (Witt-IPC)
W74-13421

INDUSTRIAL WASTE EFFLUENT MONITORING,
G. V. Cox.
American Laboratory, Vol 6, No 7, p 36-40, July, 1974. 2 tab, 3 ref.

Descriptors: *Monitoring, *Water pollution control, *Water analysis, *Analytical techniques, *Industrial wastes, *Federal Water Pollution Control Act, Alkalinity, Biochemical oxygen demand, Chemical oxygen demand, Dissolved solids, Suspended solids, Ammonia, Nitrogen compounds, Carbon, Hardness(Water), Trace elements, Metals, Organic compounds, Color, Conductivity, Turbidity, Streptococcus, Coliforms, Aquatic bacteria, Legislation, Regulation, Legal aspects, Phosphates, Sulfur compounds, Oil, Pesticides, Radioactivity, *Pollutant identification.

Legally acceptable methods for waste water analysis under the Federal Water Pollution Control Act, PL 92-500 are listed. Included are general analytical methods for determining alkalinity, BOD, COD, total solids, dissolved solids, suspended solids, volatile solids, ammonia, Kjelkahl N, nitrate, P, acidity, organic carbon, hardness, and nitrate; analytical methods for trace metals (Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Ni, K, Se, Ag, Na, Tl, Sn, V, and Zn); analytical methods for nutrients, anions, and organics (organic N, orthophosphate, sulfate, sulfide, sulfite, bromide, chloride, cyanide, fluoride, chlorine, oil and grease, phenols, surfactants, algicides, benzidine, pesticides, and chlorinated organic compounds other than pesticides); methods for estimating physical and biological parameters (color, conductance, turbidity, fecal streptococci, and coliformbacteria); and techniques for determining radiological parameters. Maximum holding times for waste discharges before analysis and preservation techniques for the most common water quality parameters are also given. (Witt-IPC)
W74-13422

SIMULTANEOUS DETERMINATION OF DIVALENT CU(2+), PB(2+), CD(2+) AND ZN(2+) IONS IN FRESH TOWN-WATER BY ANODIC STRIPPING POLAROGRAPHY, (IN JAPANESE),
National Chemical Lab. for Industry, Tokyo (Japan).
Y. Yamazaki.
Journal of the National Chemical Laboratory for Industry (Tokyo Kogyo Shikensho Hokoku), Vol 69, No 5, p 154-161, May 1974. 9 fig, 6 tab, 13 ref. English summary.

Descriptors: *Freshwater, *Municipal water, *Water analysis, *Heavy metals, *Copper, *Lead, *Cadmium, *Zinc, Cations, Analytical techniques, Chemical analysis, Pipes, Pipelines, Electrochemistry, Leaching, Solubility, Pollutant identification.
Identifiers: *Polarography.

A polarographic procedure is described for the simultaneous determination of trace amounts of divalent Cu, Pb, Cd, and Zn in city freshwater which had been retained in pipes for 24 to 72 hr. These ions were electrodeposited on a balanced-head stationary hanging mercury drop electrode at -1.5 v (vs. Hg pool) for 5 min while stirring at 300 rpm in 0.5 M Na acetate and 0.1 M K tartrate supporting medium. Anodic dissolution curves were recorded by changing the potential linearly from -1.5 to aero v at a scan rate of 50 mv/sec. The relationship between the dissolution peak currents and the pre-electrolysis potential was examined, and the effects of foreign cations on Cd and Pb, as well as the effects of surfactant on the polarographic behavior of Cu, Pb, Cd, and Zn were studied. The freshwater samples investigated contained about 0.006-0.017 ppm Cu, 0.003-0.017 ppm Pb, 0.005-0.2 ppb Cd, and 0.006-0.04 ppm Zn. The dissolution of these ions from a pipe of 98.5% Zn metal dipped in distilled water was measured at various water temperatures for different immersion times and vary chlorine concentrations. The amount of Zn dissolved (4.3-14 ppm) in pipe-retained city water and of Pb dissolved (0.7-3.6 ppm) in water retained for 24 hr in polyvinyl chloride pipes exceeded the tolerable concentrations for city water, but these amounts decreased rapidly on repeated retentions in the same pipes. (Brown-IPC)
W74-13423

ANNUAL ENVIRONMENTAL MONITORING REPORT: CALENDAR YEAR 1973,
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 5B.
W74-13429

ENVIRONMENTAL AND RADIOLOGICAL MONITORING AT THE NATIONAL REACTOR TESTING STATION DURING FY-1973 (JULY 1972-JUNE 1973),
Idaho Operations Office (AEC), Idaho Falls. Health Services Lab.
O. D. Markham.
Radiation Data and Reports, Vol 15, No 5, p 227-246, May 1974. 8 fig, 11 tab, 9 ref.

Descriptors: *Monitoring, Measurement, *Assay, Air, *Groundwater, Milk, *Soils, *Radioactivity, Environmental effects, Sampling, Background radiation, Data collections, Fallout, Regulation, Standards, Ecology, Radioecology, Lakes, Radioisotopes, Rivers, Potable water, Iodine, *Idaho, *Pollutant identification.
Identifiers: *National Reactor Testing Station(Ida), Mud Lake, Snake River.

The routine environmental monitoring program at the National Reactor Testing Station, (NRTS), Idaho during FY-1973 is described. In addition to the measurement of direct radiation exposures in the environment, the concentrations of radioactivity in air, groundwater, and milk also are determined. The results of a soil sampling program are discussed. The data from onsite and nearby community sampling locations are compared to background concentrations and the applicable standards established by the U.S. Atomic Energy Commission. In addition, several special ecological monitoring programs have been designed to assess the effect of NRTS operations on the environment. One of the ecological studies quantifies the level of radioactivity in antelope tissues collected on and near the NRTS. An investigation to ascertain the ratio of iodine-129 to stable iodine-127 in the NRTS environs also is described. (Houser-ORNL)
W74-13431

ENVIRONMENTAL LEVELS OF RADIOACTIVITY AT ATOMIC ENERGY COMMISSION INSTALLATIONS.
Division of Operational Safety (AEC), Washington, D.C.
Radiation Data and Reports, Vol 15, No 5, p 281-302, May 1974. 8 fig, 17 tab, 8 ref.

Descriptors: *Monitoring, *Radioactivity, Environment, *Data collections, *Assay, *Assessment, Safety, Evaluation, Operations, On-site investigations, Effluents, Background radiation, Regulation, Standards, *Pollutant identification.
Identifiers: Surveillance program, Rocky Flats(Colo), Sandia Laboratories(N Mex), Stanford Linear Accelerator Center(Calif).

The U.S. Atomic Energy Commission receives from its contractors annual reports on the environmental levels of radioactivity in the vicinity of major Commission installations. The reports include data from routine monitoring programs where operations are of such a nature that plant environmental surveys are required. Releases of radioactive materials from AEC installations are governed by radiation standards set forth by AEC's Division of Operational Safety in directives published in the 'AEC Manual.' Summaries are presented of the environmental radioactivity data for Rocky Flats, the Sandia Laboratories and the Stanford Linear Accelerator Center. Each of the three locations report concentrations well below the permissible limits of radioactivity. (Houser-ORNL)
W74-13432

TRITIUM IN PRECIPITATION AND FRESH-WATER SOURCES IN ISRAEL,
Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Isotope Research.
For primary bibliographic entry see Field 5B.
W74-13444

GALVESTON BAY BENTHIC COMMUNITY STRUCTURE AS AN INDICATOR OF WATER QUALITY,
Texas Univ., Port Aransas. Marine Science Inst.
J. S. Holland, N. J. Maciolek, and C. H. Oppenheimer.
Contrib Mar Sci. 17, p 169-188, 1973. Illus.

Descriptors: *Water quality, *Texas, Estuaries, Pollutants, Water pollution, *Benthos, Analytical techniques, Stress analysis, Water analysis, *Bays, Hydrographic analysis.
Identifiers: *Galveston Bay(Tex).

Various methods of community structure analysis including several species diversity indices, rarefaction curves and a probability of interspecific encounter index were applied to data collected from selected sites in Galveston Bay, Texas. Hydrographic data and sediment analysis were used in interpreting the results of the various methods of investigating community structure. The different methods of analysis used in this study showed very close agreement. Three of the 5 investigation sites in Galveston Bay showed normal estuarine water quality. Two other stations showed evidence of large amounts of stress probably due to water quality. One of the 2 was probably stressed due to natural causes, primarily salinity fluctuations. The other, a channel site near a huge industrial complex, showed intermittent stress possibly due to man-made pollution.--Copyright 1974, Biological Abstracts, Inc.
W74-13464

AN INEXPENSIVE SOLID-STATE AMPLIFIER FOR DETECTING MOVEMENTS AND ELECTRICAL POTENTIALS OF FISH,
National Water Quality Lab., Duluth, Minn.
R. A. Drummond, and W. F. Dawson.
Transactions of the American Fisheries Society, Vol 103, No 2, p 391-392, April 1974. 2 fig, 4 ref.

Descriptors: *Equipment, *Technology, *Methodology, *Monitoring, *Instrumentation, Movement, Design.
Identifiers: *Amplifiers, Heart rate, Opercular frequency.

A device for indirectly monitoring opercular frequency, 'coughs', locomotor activity and heart rate of fish is described. (Katz)
W74-13482

DETERMINATION OF NITRATE NITROGEN IN DRINKING-WATER BY CADMIUM-COPPER REDUCTION, (IN JAPANESE),
Aichi Prefecture Inst. of Public Health, Nagoya (Japan).
B. Tomita, H. Nakashima, and N. Hamamura.
J Hyg Chem. Vol 19, No 2, p 88-93, 1973. Illus. English summary.

Descriptors: *Nitrogen, *Potable water, Nitrates, *Pollutant identification.
Identifiers: *Nitrate nitrogen.

A method of Cd-Cu reduction, which was used for sea water, was applied to the determination of nitrate N2 in drinking water. This is more accurate, sensitive and more simple than ordinary methods. One ml of 0.1 M NaCl solution is added to 50 ml of a sample aliquot containing between 0.15 and 100 microgram of nitrate N2. After rinsing the Cd-Cu column with 2mM EDTA.4Na solution, the test solution is passed through the column (column length 12 cm, flow rate 10-20 ml/min). Nitrate is quantitatively reduced to nitrite and many substances in drinking water do not interfere with the reduction. The initial 15 ml of the effluent is discarded and the next 10 ml of effluent is collected. The nitrite N2 concentration of the effluent is determined by diazotization.--Copyright 1974, Biological Abstracts, Inc.
W74-13498

5B. Sources Of Pollution

DISPOSAL OF HEATED WATER THROUGH GROUNDWATER SYSTEMS - VOL. I: TECHNICAL AND ECONOMIC FEASIBILITY,
Kansas Univ., Lawrence. Water Resources Research Inst.
G. P. Willhite, J. Wagner, F. Simonpietri, and J. Stoker.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 302, $5.75 paper copy, $2.25 microfiche. Completion Report, Contribution No 134, July 1974. 134 p, 42 fig, 15 tab, 63 ref. OWRT B-023-KAN(1). 14-31-0001-3284.

Descriptors: *Groundwater, *Mathemat models, *Porous media, *Heat transfer, Ins mentation, Economics, Flow, *Thermal polluti Heated water, Waste disposal, *Simulation an sis, *Feasibility studies, Cost comparisons, M ing.
Identifiers: Scaled models, Thermal discharge.

A process to dispose of heated water throug groundwater system, hydraulically connected the bottom of a river, was studied to evalu technical and economic feasibility. Three dim sional mathematical models of fluid flow and h transfer in porous media were developed to si late the heat disposal process for a prototype a vium connected to the Kansas River. In the pr type 90 degree F water was injected into the alh um at rates of 300 gpm/well. For the conditi studied, over 90% of the injected energy wo enter the river through its bottom when a qu steady state was reached. Mixing of the hea water with the cooler 60 degree F river water simulated in scaled model experiments. The streams were completely mixed within a sh distance downstream of the interchange reg when the hot water rate varied between 3.1% 6% of the cold water rate. An economic analy was made to determine the costs of ene disposal at rates of 1.5 x 10 to the 7th power, 1 10 to the 8th power, and 3.0 x 10 to the 8th po Btu/hr using the ground water disposal proc Costs were compared with those estimated heat disposal using a mechanical draft wet coo tower. Disposal through the groundwater syst was significantly more expensive than via cooling water. (See also W74-12754)
W74-12753

DISPOSAL OF HEATED WATER THROU GROUNDWATER SYSTEMS, VOLUME USER'S MANUAL NUMERICAL SIMULATI OF FLUID FLOW AND HEAT TRANSFER GROUNDWATER SYSTEMS,
Kansas Univ., Lawrence. Water Resour Research Inst.
G. P. Willhite, and J. Wagner.
Available from the National Technical Infor tion Service, Springfield, Va 22161 as PB-236 3 $7.25 paper copy, $2.25 in microfiche. Complet Report, Contribution No 134, July 1974. 202 p, fig, 5 tab, 2 append. OWRT B-023-KAN(1).

Descriptors: *Groundwater, *Mathemat models, Porous media, Heat transfer, Instrum tation, Economics, Flow, *Thermal polluti Heated water, Waste disposal, *Simulation ana sis, *Feasibility studies, Cost comparisons, M ing, *Computer programs.
Identifiers: Scaled models, Thermal discharge.

A numerical model was developed in an effor determine some of the conditions under wh groundwater systems can be used to introd heated water into a larger body of water when temperature of the larger body remains wit thermal pollution limits. The model is used simulate the injection and flow of water and h through the alluvium and the distribution of hot water as it enters the river channel. The phy cal model has been presented in Volume I. T mathematical model is capable of simulating process for a variety of river and alluvi geometries using different distributions of inj tion wells and injection rates per well. Simulat is based on the combined numerical solution of three-dimensional transient heat and fluid fl equations in the alluvium. A computer progr has been written in FORTRAN IV for Honeywell 635 computer. Memory requireme are determined by the dynamic storage allocat system so as not to exceed the core size specif on the control card. (See also W74-12753)
W74-12754

IE WATER RELATIONS OF THE ALGA
YANIDIUM CALDARIUM IN SOIL,
lifornia Univ., Los Angeles. Dept. of Bac-
iology.
W. Smith, and T. D. Brock.
Gen Microbiol. Vol 79, No 2, p 219-231, 1973.
us.

escriptors: *Cultures, Water, *Algae, Soil algae,
otosynthesis, Growth, Bacteria, Soil bacteria,
ability.
entifiers: *Cyanidium-caldarium.

e effects of water potential on the photosynthe-
, growth and viability of natural populations and
oratory cultures of Cyanidium caldarium were
easured. C. caldarium was very sensitive to
duced water potential, with matric reduction
ing more harmful than osmotic. The distribution
this alga in different soil areas appeared to be
ated to the sensitivity to water stress, larger
pulations being found in areas with higher water
tential. There are very steep gradients of water
tential in the soils where C. caldarium is found.
e water potential of the surface crust is much
low to allow growth and C. caldarium is found
a subsurface layer. The reduced light intensity
ow the soil surface interacts with the increased
ter potential to define the position of the algal
er.--Copyright 1974, Biological Abstracts, Inc.
74-12777

CONOMIC GROWTH AND THE GENERA-
ON OF WATERBORNE WASTES,
ode Island Univ., Kingston. Dept. of Resource
onomics.
Feld, and N. Rorholm.
ailable from the National Technical Informa-
n Service, Springfield, Va 22161 as COM-74-
162, $2.75 in paper copy, $2.25 in microfiche.
arine Technical Report No 12, 1973. 19 p, 1 fig,
tab, 7 ref.

escriptors: *Economic impact, *Industrial
stes, *Water pollution sources, Domestic
stes, Legislation, Income, Regulation, Mathe-
atical models, Rhode Island.
entifiers: Systems analysis, Narragansett
y(RI), Waste loadings, Waste generation,
aste multipliers.

method to quantify the interaction between
onomic activity and water effluent loading are il-
strated for the area surrounding Narragansett
y, Rhode Island encompassing the Providence
andard Metropolitan Statistical Area plus
uidneck Island. The Rhode Island portion of the
dy area includes 95.5% of the state's total popu-
ion, 93.5% of its firms, 96.5% of its employ-
nt. The methodology illustrated consists of two
ps. First an economic model depicting
onomic activity within the region for the year
67 was developed. The data was set within an
put-output framework so that each of the 59
ntified endogenous sectors' input and output
ws can be traced. Next the economic model is
ked to two environmental matrices to show how
e economic interdependencies are related to
ste generation. The first incorporates waste
efficients by columns denoting specific wastes
nerated. The second incorporates data on en-
ronmental resource use with each row cor-
sponding to a specific natural resource. Merging
these matrices is discussed. Effluent data were
tained primarily from permit applications sub-
tted by Rhode Island firms to the Corps of En-
neers. Results from the modeling application in-
cate the waste products generated as a result of
er-industry dependencies are of substantial im-
rtance to the regional ecology. (Schroeder-
isconsin)
74-12782

THE GROWTH OF SELECTED MYCORRHIZAL FUNGI IN RESPONSE TO INDUCED WATER STRESS,
Colo. State Univ, Dep. for and Wood Sci., Fort Collins, Colo. Colorado State Univ., Fort Collins. Dept. of Forest and Wood Science.
J. Mexal, and C. P. P. Reid.
Can J Bot. Vol 51, No 9, p 1579-1588, 1973, Illus.

Descriptors: *Aquatic fungi, *Cultures, Water pollution, Water pollution sources, Pollutant identification, *Investigations, *Soil moisture, Moisture.
Identifiers: Cenococcum-Graniforme, Ethylene, Glycol, Mycorrhizal, Osmoticum, Suillus-Luteus, Thelephora-Terrestris.

Three ectomycorrhizal fungi, Cenococcum graniforme, Suillus luteus and Thelephora terrestris were grown in artificial nutrient media. Water potential of the media was varied by the use of the osmoticum polyethylene glycol (PEG) 4000 and measured by thermocouple psychrometry. C. graniforme was very tolerant of low water potentials and exhibited maximum growth at a potential of -15 bars. Maximum growth of S. luteus and T. terrestris occured at -5 bars. The water potential of solutions containing PEG 4000 appears to consist of both an osmotic and matric component, making PEG 4000 ideally suited for simulation of soil moisture stress. It was neither metabolized nor readily absorbed by C. graniforme as inorganic salts or sugars might be.--Copyright 1974, Biological Abstracts, Inc.
W74-12789

OBSERVATIONS OF MIXING AND DIFFUSION IN POROUS MEDIA,
Mobile Research and Development Corp., Dallas, Tex.
For primary bibliographic entry see Field 2F.
W74-12812

PHYSICO-CHEMICAL AND MICROBIAL REACTION EFFECTS ON TRANSPORT IN POROUS MEDIA,
Wisconsin Univ., Madison. Dept. of Soils.
W. R. Gardner.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 667-682, 1972. 61 ref.

Descriptors: *Path of pollutants, *Soil water movement, Darcys law, Rheology, Filtration, Unsaturated flow, Biochemistry, Water chemistry, Porous media, Soil chemistry, Clay minerals.

Many physicochemical and biological reactions occur in such porous media as soils in the field. These can profoundly influence the flow of the liquid phase. Some of the more well-known processes are discussed in terms of Darcy's law. Surface tension and contact angle effects can be taken into account through their influence upon the potential energy of the soil water, unless the soil particle surfaces are nonwettable. Semiempirical expressions are available for predicting the permeability of swelling soils for mixed calcium-sodium systems. Soil clogging due to bacterial activity during prolonged submergence is well documented but not well understood. Some evidence exists that the flow in soils used as biological and physicochemical filters may be non-Newtonian. Complete understanding of chemical and biological effects requires consideration of coupled flow of soil water, solutes, and gases. (See also W74-12811) (Knapp-USGS)
W74-12850

SOME RECENT APPLICATIONS OF THE THEORY OF DISPERSION IN POROUS MEDIA,
Ecole Nationale Superieure des Mines de Paris, Fontainebleau (France). Center for Geological Information.
For primary bibliographic entry see Field 2F.
W74-12854

SOLUTE TRANSPORT IN AGGREGATED SOILS: TRACER ZONE SHAPE IN RELATION TO PORE-VELOCITY DISTRIBUTION AND ADSORPTION,
Hawaii Univ., Honolulu.
R. E. Green, P. S. C. Rao, and J. C. Corey.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 732-752, 1972. 4 fig, 3 tab, 16 ref.

Descriptors: *Path of pollutants, *Tracers, *Pesticides, *Soil water movement, Adsorption, Porosity, Velocity, Tritium, Dispersion.

Two tracers, tritiated water and picloram, were displaced in laboratory columns of two aggregated subsoils to evaluate the importance of micropore retention and pore-velocity distribution on the transport of solutes in near-saturated soil. Molokai soil, with a wider range of pore sizes, gave asymmetrical tracer zone shapes for both tritium and picloram, while Cecil soil gave nearly symmetrical effluent concentration zones. The apparent coefficient of molecular diffusion for tritium in Molokai soil was about 10 times greater than that for Cecil soil. Secondary peaks on tracer zones for the Molokai soil were intensified by air entrapment and high flow velocity. Calculations of effective pore volume for tritium breakthrough indicated there was no apparent exclusion of water-filled pores from the flow process in either soil. Pore-size distribution and hydraulic conductivity values for the two soils indicated that asymmetric zone shapes for Molokai were due principally to extremely high velocities in pores greater than 150 micrometers in diameter relative to flow in smaller pores. Picloram breakthrough, relative to tritium, was retarded more than was predicted by equilibrium adsorption measurements. (See also W74-12811) (Knapp-USGS)
W74-12855

COMPARISON OF DISPERSION CHARACTERISTICS IN FISSURED ROCK,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
E. Castillo, R. J. Krizek, and G. M. Karadi.
In: Proc of 2nd International Symposium on Fundamentals of Transport Phenomena in Porous Media, August 7-11, 1972, Guelph Univ, Ontario: International Association for Hydraulic Research and International Society of Soil Science Joint Pub, Vol II, p 778-797, 1972. 12 fig, 2 tab, 6 ref.

Descriptors: *Dispersion, *Groundwater movement, *Joints(Geologic), *Path of pollutants. Turbulent flow, Laminar flow, Hydrogeology, Mathematical models.

Time-dependent hydrodynamic dispersion of a contaminant was studied in a mathematical model of a jointed rock mass that consists of two families of plane parallel joints with equal spacings and joint openings. The contaminant is assumed to possess the same properties as the parent fluid in the rock joints, and the surfaces of the joints are considered to be geochemically stable; the intact rock is treated as impermeable. and it does not contribute to the dispersion process. Equipotential lines which make equal angles with the two sets of joints lead to equiconcentration contours which are straight lines parallel to the equipotential contours. Deviations from this situation become greater as the relative differences between the gradients in each joint set increase. The existence of laminar or turbulent flow does not significantly influence the shapes of the equiconcentration contours, although velocities may differ considerably. Joint orientation exerts a strong influence on both the shapes of the equiconcentration contours and

the overall propagation velocity. Confined aquifers may exhibit overall propagation velocities which are twice those for an unconfined aquifer. (See also W74-12811) (Knapp-USGS)
W74-12857

APPLICATION OF BOUNDARY-LAYER THEORY TO DISPERSION IN WELL-MIXED ESTUARIES,
Nielsen Engineering and Research, Inc., Mountain View, Calif.
G. D. Kuhn, and J. N. Nielsen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 288, $5.75 in paper copy, $2.25 in microfiche. Technical Report NEAR TR 63, September 1974. 129 p, 30 fig, 1 tab, 17 ref. OWRR C-3189(3698)(2).

Descriptors: *Estuaries, *Longitudinal dispersion, *Turbulent boundary layers, *Mixing, Flow, Water pollution, Momentum equations, Fluid friction, *Diffusion, *Path of pollutants, *Dispersion, Roughness(Hydraulic), Model studies.

A theory is presented for calculating the complete velocity field of long, well-mixed estuaries which vary in cross section. The method is based on boundary-layer theory in that the vertical profiles of velocity in the estuary are assumed to have the analytical form characteristic of turbulent boundary layers. That analytical form is used to calculate the vertical profiles of velocity after the lateral variation of the vertically averaged velocity and bottom shear stress have been calculated with the help of data obtained from a tidal model. Comparison of calculated velocity distributions with velocities measured in a real estuary indicate that the method gives good estimates of the complete velocity distributions in real estuaries. An important parameter in the calculation of velocity distributions was found to be related to the roughness of the bottom of the estuary. This parameter can be evaluated for a particular estuary from knowledge of the boundary roughness, or from comparison with a typical vertical velocity profile. Using the velocity distribution theory, a method was derived for calculating dispersion coefficients for use in a gross diffusion equation for estimating the dispersion of pollutants in the estuary. A method of determining the necessary eddy-viscosity variations for vertical mixing was developed for use with the formulation. Subsequent dispersion calculations indicated that the coefficients could adequately predict the dispersion of dye measured in the U.S. Army Engineers Delaware River Model.
W74-12858

OCCURRENCE AND DISTRIBUTION OF CLAY MINERALS AND TRACE METALS IN THE BOTTOM SEDIMENT OF BILOXI BAY, MISSISSIPPI,
Mississippi Univ., University. Dept. of Geology and Geological Engineering.
For primary bibliographic entry see Field 2L.
W74-12860

ANALYSIS OF NUTRIENT SUPPLIES FOR ALGAE IN ELEPHANT BUTTE RESERVOIR,
New Mexico Univ., Albuquerque. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-12861

ANALYSIS OF WATER CHARACTERISTICS OF MANUFACTURING INDUSTRIES AND THEIR ADAPTABILITY TO SEMI-ARID REGIONS,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 3E.
W74-12863

TREATMENT OF LIQUID WASTES FROM CANE SUGAR INDUSTRY,
Puerto Rico Univ., Mayaguez. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W74-12865

COMPONENT DESCRIPTION OF SEDIMENT-WATER MICROCOSMS,
Utah State Univ., Logan. Center for Water Resources Research.
For primary bibliographic entry see Field 5C.
W74-12868

CHEMICAL AND BIOLOGICAL QUALITY OF SEWAGE EFFLUENTS,
Rutgers-the State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 5D.
W74-12870

CHEMICAL AND BIOLOGICAL QUALITY OF MUNICIPAL SLUDGE,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-12871

EFFECTS OF LAND DISPOSAL OF WASTE-WATERS ON SOIL PHOSPHORUS RELATIONS,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12880

EFFECTS OF LAND DISPOSAL OF WASTE-WATER ON EXCHANGEABLE CATIONS AND OTHER CHEMICAL ELEMENTS IN THE SOIL,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12881

FACTORS AFFECTING NITRIFICATION-DENITRIFICATION IN SOILS,
California Univ., Davis. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 5D.
W74-12882

BIOTOXIC ELEMENTS IN SOILS,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12883

FINAL ELK RIVER REACTOR SITE SURVEY, RESULTS AND SUMMARY - JULY 23, 1974.
United Power Association, Elk River, Minn.
Report No COO-651-92, July 23, 1974. 72 p, 5 fig, 19 tab, 2 append.

Descriptors: *Monitoring, *Surveys, *Sites, *Nuclear powerplants, Radiation, Radioactivity, Radioisotopes, Background radiation, Assay, Measurement, *Environmental effects, Abatement, *Minnesota.
Identifiers: *Elk River Powerplant(Minn), Elk River.

A detailed post-dismantling radiation survey of the Elk River reactor site was completed during June and July of 1974. A survey was made prior to backfill of the reactor building cavity but after all sources of radiation were either removed from the site or packaged for shipping and disposal. The techniques and methods used during the final Elk River Reactor site survey are described and the results of the survey are presented. No evidence of radiation levels in excess of normal background was found during the final reactor site survey. T radiation levels detected on site are consiste with normal levels previously measured in the o site environment during the routine environmen surveillance program. (Houser-ORNL)
W74-12903

FIELD INVESTIGATIONS OF HEATE DISCHARGES FROM NUCLEAR POWE PLANTS ON LAKE MICHIGAN: 1972,
Argonne National Lab., Ill.
A. A. Frigo, D. E. Frye, and J. V. Tokar.
Available from NTIS, Springfield, Va. 22161, ANL/ES-32; $7.50/copy, $2.25 microfiche. Repo No ANL/ES-32, March 1974. 241 p, 158 fig, 8 ta 12 ref, 5 append, 1 biblio.

Descriptors: *Nuclear powerplants, *Effluen *Lake Michigan, *Thermal pollution, *Water p lution, Water pollution sources, Temperatu Water cooling, Water temperature, Meteorolog Model studies, Data collections.
Identifiers: *Plume studies, *Thermal plumes.

A partial compilation is presented of therm plume field data collected during 1972 under t auspices of the Great Lakes Research Progra funded by the Atomic Energy Commission. Thi thermal plumes are presented, 15 each for t Point Beach and Palisades Nuclear Power plant both located on Lake Michigan. The 1972 da together with studies performed in previous yea were obtained to demonstrate the variability plume configurations under a wide range of e vironmental conditions and collectively are bei used to test the validity of several widely used p dictive model formulations. General observatio of the field data on relation to ambient lake a meteorological conditions are presented. Ho ever, a more detailed analysis of the data will reported separately. (Houser-ORNL)
W74-12904

ECOLOGY AND ANALYSIS OF TRACE CO TAMINANTS, PROGRESS REPORT JUNE 19 JANUARY 1973.
Oak Ridge National Lab., Tenn.
Available from NTIS, Springfield, Va. 22161, ORNL-NSF-EATC-1; $11.50/copy, $2. microfiche. Report No ORNL-NSF-EATC March 1973. 453 p, 95 fig, 69 tab, 266 ref.

Descriptors: *Ecology, *Trace elements, *S contamination, *Water pollution, *Research a development, Technology, Analysis, Evaluatio Radioactivity, Ecosystems, Management, Toxi ty, Measurement, Analytical techniques, Centri gation, Solvent extractions, Public health.

The work reported is conducted within eight di sions of the Oak Ridge National Laboratory, pl the Environmental Information System. Seve Task teams comprise personnel from more th one division. Accordingly, it is a multi-disciplina activity. While the work is reported as 15 separa Tasks, it is emphasized that there is strong intera tion among the various tasks which is indicated a scheduling chart for the work and throughout t text where particularly appropriate. Interactio and relationships, both within the program a between the program and those of other instit tions who will use the results of the EATC wo are also discussed. Detailed reports of the Tasks, an executive summary and a discussion the organization and management of the progra within ORNL, are presented. The work fa within several broad research areas incorporati both field and laboratory work. (See W74-129 thru W74-12920) (Houser-ORNL)
W74-12905

DEVELOPMENT OF AN ENVIRONMENTA UNIFIED TRANSPORT MODEL FOR TOX MATERIALS,
Oak Ridge National Lab., Tenn.

. Brooks, R. D. Ellison, D. E. Fields, J. B.
kin, and M. T. Mills.
Report No ORNL-NSF-EATC-1, p 27-59,
ch 1973. 3 fig, 28 ref.

criptors: *Model studies, *Hydrology, drologic data, *Systems analysis, Ion trans-, *Air pollution, Water, Toxins, Toxicity, ic health, Water chemistry, Biological proper- Meteorology, Ecology, Evaluation, *Path of ıtants.

rational submodels for hydrologic transport air transport of toxic materials have been im- ented. These two submodels have recently merged to form the initial version of a ied Transport Model. This unified model is ently being validated using 3 previous years of from the Walker Branch Watershed and cur- data at the Oak Ridge site. Development of nical and biological exchange submodels has n but is presently in a preliminary phase. nsive communication links have been olished with workers in the fields of hydrolo- neteorology, ecology, and other disciplines to re that the final version of the Unified Trans- Model will be of practical value. (See also -12905) (Houser-ORNL)
-12906

'IRONMENTAL MONITORING OF TOXIC TERIALS IN ECOSYSTEMS,
Ridge National Lab., Tenn.
V. Andren, J. A. C. Fortescue, G. S.
derson, D. E. Reichle, and R. I. Van Hook.
Report No ORNL-NSF-EATC-1, p 61-119,
ch 1973. 23 fig, 9 tab, 18 ref.

criptors: *Monitoring, *Data collections, xins, *Toxicity, *Abiotic environment, vironmental control, *Biota, Ecology, systems, Trace elements, Hydrologic budget, trol, Water pollution, Watershed protection, est watersheds, Hydrologic models, Model ies, *Path of pollutants.

Task is addressed to the problem of develop- a useful body of information concerning natu- nd man-influenced levels of selected toxic and ntially toxic materials in both biotic and tic components of the environment. The long- technical objectives include (1) development race contaminant profiles in a major forest system in east Tennessee; (2) synthesis of e data into an input-output budget of water trace contaminants through a forested ershed; (3) development of ecological models various subsystems within this watershed for cribing and predicting the movement and accu- ation of trace contaminants in ecological ems; and (4) development of a numerical data through the Toxic Materials Information ter on trace contaminants to serve as a valida- data set for the United Transport Model. The k reported for the first years effort is con- ed primarily with levels of elements in soils, etation, animals, sediments, and water in east west Tennessee. (See also W74-12905) user-ORNL)
-12907

OLOGY OF TOXIC METALS,
Ridge National Lab., Tenn.
. Blaylock, R. A. Goldstein, J. W. Huckabee,
anzen, and C. Matti.
Report No ORNL-NSF-EATC-1, p 121-160,
ch 1973. 13 fig, 7 tab, 23 ref.

criptors: *Metals, *Toxins, Toxicity, ology, *Ecosystems, *Mercury, *Cadmium, vement, Cycling nutrients, Food chains, Ab- tion, Transfer, Ion transport, Radioactive ers, Aquatic environment, Model studies, th of pollutants.

Experiments are described on the movement and concentration of mercury and cadmium in different ecosystems. Radiotracer techniques and stable chemical analyses were used in cycling and food chain studies in aquatic and terrestrial ecosystems. Direct uptake and transfer efficiencies through a simple aquatic food chain were determined for CH3 203HgCl, 203Hg(NO3)2 and 109Cd(NO3)2.. Methylmercury was much more efficiently transferred through the food chain than inorganic mercury or cadmium. A linear eight compartment model was developed to describe the dynamic redistribution of methylmercury in a pond ecosystem using data collected by radiotracer techniques. The general mobility of mercury and cadmium in terrestrial ecosystems and the extent to which they concentrate in various components were compared. (See also W74-12905) (Houser-ORNL)
W74-12908

TOXIC METALS IN LAKE AND RIVER SEDIMENTS,
Oak Ridge National Lab., Tenn.
E. A. Bondietii, R. M. Perhac, F. H. Sweeton, and T. Tamura.
In: Report No ORNL-NSF-EATC-1, p 161-195, March 1973. 7 fig, 8 tab, 13 ref.

Descriptors: Assessment, *Metals, *Toxins, Toxicity, Measurement, *Cadmium, *Zinc, *Sediments, Rivers, Streams, Assay, Analysis, Analytical techniques, Suspended solids, Sedimentology, Soils, Absorption, *Lake sediments, *Path of pollutants.
Identifiers: *Holston River, *Joe Mill Creek, Tennessee, Concentration.

Cadmium and zinc concentrations were determined in the sediments of two East Tennessee streams: (1) the Holston River near the Mascot (Tennessee) zinc beneficiation plant and (2) Joe Mill Creek, a stream flowing over a natural zinc outcrop. The cadmium concentration in the bottom sediment of the Holston is higher (approx 50 ppm) than in Joe Mill Creek (approx 3.5 ppm). The cadmium concentration in the suspended sediments of the Holston samples was similar to that in the associated bottom sediments; in the suspended sediments of Joe Mill Creek the concentration of cadmium was about five times that in the bottom sediments. The concentration of cadmium in the water during the fall season was between 2 and 3 ppb in both rivers, which is below the recommended limit of 10 ppb for drinking water supplies. (See also W74-12905) (Houser-ORNL)
W74-12909

ZONAL CENTRIFUGATION: APPLIED ASPECTS IN ELUCIDATING CHEMICAL AND BIOLOGICAL FORMS, DISTRIBUTION AND AVAILABILITY OF HEAVY METALS IN THE ENVIRONMENT,
Oak Ridge National Lab., Tenn.
F. N. Bolton, F. S. Brinkley, M. W. Callahan, C. W. Francis, and R. Levy.
In: Report No ORNL-NSF-EATC-1, p 197-226, March 1973. 1 fig, 11 tab, 12 ref.

Descriptors: *Heavy metals, *Centrifugation, *Water treatment, Water purification, *Cadmium, Vegetation, *Soils, *Absorption, *Desorption, *Chelation, Chemical reactions, Clays, Iron, Zinc, Metals, Environment, Selenium, Research and development, Ecosystems, Path of pollutants.

Work reported involved evaluating conditions which influence the availability of cadmium to plants and the adsorption of polyvinylpyrrolidone on clays. Polyvinylpyrrolidone (PVP) is a nonionic synthetic polymer used as a peptizing agent for clays in the nonaqueous density gradients used in zonal centrifugation of soils and sediments. In a series of separate experiments, factors which influence plant uptake of cadmium were evaluated. In nutrient solutions, factors investigated were the concentration of calcium, nitrogen, selenium and hydrogen. Cadmium uptake by plants was the same at pH 4 and at pH 6. However, if an iron chelating agent was used in the nutrient solutions as a source of iron, cadmium uptake was greater at the lower pH. Calcium and nitrogen amendments appeared to depress uptake of cadmium in plants. On the other hand, zinc in concentrations of 5 and 10 ppm enhance cadmium uptake as compared to solutions containing 1 ppm zinc. (See also W74-12905) (Houser-ORNL)
W74-12910

HYDROLYTIC BEHAVIOR OF TOXIC METALS,
Oak Ridge National Lab., Tenn.
C. F. Baes, Jr., and R. E. Mesmer.
In: Report No. ORNL-NSF-EATC-1, p 227-245, March 1973. 2 fig, 2 tab, 67 ref.

Descriptors: Research and development, *Metals, *Hydrolysis, *Chemical reactions, Hydrogen ion concentration, Behavior, Chemistry, *Toxins, *Reviews, Mercury, Zinc, Cadmium, Copper, Beryllium, Lead, Tin, Bismuth, Arsenic, Antimony.

Most metal ions hydrolyze in solutions of intermediate pH to produce a set of hydroxy complexes, Mx(OH)y(nx-y), whose identities are often unresolved and whose distributions depend on both metal ion concentration and pH. Identification of the formula and charge of these hydrolysis products is essential to understanding important aspects of the chemistry of the element. Ten important toxic metal ions have been selected for a critical review of the literature on their hydrolysis behavior. These are: Hg(2+), Zn(2+), Cd(2+), Cu(2+), Be(2+), Pb(2+), Sn(2+), Bi(3+), As(III) and Sb(III). Reviews of the first six of these are now complete so that the identity of the significant hydrolysis species has been judged and the best values selected for equilibrium quotients relating these to the acidity and the solid oxide and hydroxide phases which occur. (See also W74-12905) (Houser-ORNL)
W74-12911

DEVELOPMENT OF HIGH SENSITIVITY X-RAY FLUORESCENCE FOR ANALYSIS OF TRACE TOXIC ELEMENTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12912

ENVIRONMENTAL APPLICATIONS OF CENTRIFUGAL PHOTOMETRIC ANALYSIS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12913

SEPARATION, DETECTION, AND IDENTIFICATION OF ORGANICALLY BOUND TOXIC METALS AND OTHER HAZARDOUS MATERIALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12914

MEASUREMENT OF MOLECULAR ORGANIC CONTAMINANTS IN POLLUTED WATER,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12915

RAPID N-15 ISOTOPIC-RATIO ANALYTICAL SYSTEM FOR ENVIRONMENTAL SAMPLES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12916

REMOVAL OF MERCURY AND OTHER TOXIC METALS FROM PLANT EFFLUENT SOLUTIONS BY SOLVENT EXTRACTION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-12917

ELECTROCHEMICAL REMOVAL OF REDUCIBLE INORGANIC POLLUTANTS FROM AQUEOUS STREAMS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-12918

THE FLOW OF MERCURY IN SOCIETY,
Oak Ridge National Lab., Tenn.
W. E. Clark.
In: Report No. ORNL-NSF-EATC-1, p 391-407, March 1973. 2 fig, 3 tab, 10 ref.

Descriptors: *Mercury, Water pollution, *Water pollution sources, *Surveys, Data collections, Environmental effect, Waste disposal, Zinc, Manganese, Oxides, *Pollution abatement, *Path of pollutants.

About half of the known mercury reprocessors in the United States responded to a questionnaire concerning their output in 1970. Production from those responding was 579,788 lb compared with U.S. Bureau of Mines figures of 582,160 lbs for secondary mercury. The actual amount recycled must, therefore, have been considerably greater than that reported. A survey of the usage of mercury by agencies of the U.S. Government has been made. Returns received by February 1, 1973, from 577 sites and subagencies accounted for preliminary totals of 61,011 lbs of mercury in metal and chemical forms and 32,177 lb in manufactured items. Data on recycle and disposal practices are also included. Mercury insult to the environment can be decreased by recycling primary batteries. In 1968 about 1.2 million lb of mercury were used in primary battery manufacture, about 75% of which was in mercury batteries, and 25% in zinc primary batteries. The latter also used more than 19,000 tons of zinc as well as thousands of tons of MnO2 and carbon electrodes, recovery of which is technically feasible. A tentative flowsheet for recovery of these materials as well as mercury is included. (See also W74-12905) (Houser-ORNL)
W74-12919

TOXIC MATERIALS INFORMATION CENTER ENVIRONMENTAL INFORMATION SYSTEMS OFFICE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12920

EFFECT OF FLOODING AND CROPPING ON THE CHANGES IN THE INORGANIC PHOSPHATE FRACTIONS IN SOME RICE SOILS,
University of Agricultural Sciences, Mandya (India). Regional Research Station.
For primary bibliographic entry see Field 2G.
W74-12925

THE RECENT SEDIMENTS OF WINDERMERE,
Leicester Univ. (England). Botany Lab.
For primary bibliographic entry see Field 2J.
W74-12931

THE BIOLOGICAL MEASUREMENT OF WATER QUALITY,
Institute of Paper Chemistry, Appleton, Wis. Div. of Industrial and Environmental Systems.
For primary bibliographic entry see Field 5A.
W74-12932

PROTEIN RECOVERED FROM INDUSTRIAL WASTE WATER AS FEED FOR CHICKS,
Norges Landbrukshoegskole, Vollebekk. Dept. of Poultry and Fur Animal Science.
O. Herstad, and H. Hvidsten.
Acta Agriculturae Scandinavica, Vol 23, No 3, p 151-156, 1973. 7 tab, 10 ref.

Descriptors: *Sulfite liquors, *Lignins, *Sulfonates, *Pulp wastes, *Proteins, *Yeasts, *Poultry, Nutrients, Solid wastes, Industrial wastes, Pulp wastes, Pulp and paper industry, Byproducts, Waste water(Pollution), Effluents, Chemical precipitation, Food processing industry.
Identifiers: Lignoprotein, Animal fodder.

Lignoprotein produced by precipitating the proteins in waste waters from a herring fillet factory with lignosulfonic acids from a torula yeast plant (utilizing spent sulfite pulping liquors) was tested as a poultry fodder. Results indicated that up to 8.5% of lignoprotein can be used in chicken feed without harmful effects. (Buchanan-IPC)
W74-12933

INDUSTRIAL WASTES: PAPER AND APPLIED PRODUCTS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-12941

BIOCHEMICAL DEGRADATION BEHAVIOR OF SULFITE PULP MILL WASTE WATER AND ITS CONSTITUENTS (BIOCHEMISCHES ABBAUVERHALTEN VON SULFITZELLSTOFFABWASSER UND SEINEN INHALTSSTOFFEN),
G. Otto.
Zellstoff und Papier, Vol 23, No 2, p 42-46, Feb 1974. 4 fig, 3 tab, 8 ref.

Descriptors: *Pulp wastes, *Biodegradation, *Carbohydrates, *Sulfite liquors, Biochemical oxygen demand, Chemical oxygen demand, Effluents, Activated sludge, Organic loading, Oxygen demand, Hardwood, *Waste water treatment, Industrial wastes.
Identifiers: Wash waters, Pulp washing, Glucose, Xylose, Rhamnose, Monosaccharides, Fagus(or Beech trees), Pulp mills, Sulfite pulp mills.

The composition of aqueous effluents from the pulp-washing stage of a sulfite pulp mill utilizing beechwood was determined, and the proportionate share of each effluent component in the COD and BOD of the total effluent was ascertained by an oxygen balance. In batch experiments, the rate of elimination of pure monosaccharides was determined singly and in mixtures, indicating that glucose was removed most rapidly, rhamnose most slowly. Considering their original concentration in the effluent, however, acetic acid and xylose showed the most rapid degradation. In a continuous model of biochemical waste water purification with activated sludge settling, the capacity for treating diluted effluent (800-1000 mg BOD/liter) approximated a volumetric loading of 42 g of BOD/liter/day. (Ward-IPC)
W74-12942

THE CHARACTERIZATION OF SPENT ALKALI/OXYGEN BLEACHING LIQUOR,
State University of New York, Syracuse. Coll. of Environmental Science and Forestry.
For primary bibliographic entry see Field 5A.
W74-12943

THE EFFECT OF SELECTED DYES IN THE ENVIRONMENT,
Crompton and Knowles Corp., Reading, Pa. Dyes and Chemicals Div.
For primary bibliographic entry see Field 5C.
W74-12950

DETERMINATION OF PHENOLS IN I FLUENTS BY VOLTAMMETI (OPREDELENIE FENOLOV V STOKA VOL'TAMPEROMETRICHESKIM METODO
Tsentralnyi Nauchno-Issledovatelski Les himicheski Institut, Khimki (USSR).
For primary bibliographic entry see Field 5A.
W74-12964

INCREASE IN CONDUCTIVITY OF IRRIG TION WATER DURING SPRINKLING,
California Univ., Davis. Dept. of Water Scie and Engineering.
For primary bibliographic entry see Field 3F.
W74-12966

PRODUCTION AND RELEASE OF RADIOA TIVE KRYPTON- AND XENON-ISOTOPES NUCLEAR POWER PLANTS A REPROCESSING PLANTS AND THE E PECTED RADIOLOGICAL BURDEN TILL T YEAR 2000, (ERZEUGUNG UND FREISE ZUNG VON RADIOAKTIVEN KRYPTON- U XENON-ISOTOPEN DURCH KERNREA TOREN UND WIEDERAUFARBEITUNG SA LAGEN UND DIE VORAUSSICHTLIC RADIOLOGISCHE BELASTUNG BIS ZU JAHR 2000),
Kernfurschungszantrum, Karlsruhe (West G many).
For primary bibliographic entry see Field 5A.
W74-12971

EFFLUENTS FROM WASTE PAPER STO CLEANING (SCIEKI PO OCZYSZCZAN MASY MAKULATUROWEJ),
Instytut Celolozowo-Papierniczy, Wars (Poland).
Z. Skwara.
Przeglad Papierniczy, Vol 30, No 2, p 64-66, 1974. 3 tab, 12 ref.

Descriptors: *Recycling, *Pulp wastes, Wa water(Pollution), Waste treatment, *Waste wa treatment, *Organic loading, *Biochemical oxyg demand, *Suspended solids, Industrial wast Solid wastes, Pulp and paper industry, Euro Effluents, Pollution abatement, Biological tre ment, Economics.
Identifiers: *Poland, Waste paper, Newspri Fine paper, Printing paper, Writing paper, Wh paper(Paper machine), Paperboard, Second fibers, Reclaimed fibers, Deinking, Inks, Print inks, Board machines, Paper machines.

By 1980 A.D., waste paper may account for 4 of all fibers used for paper and board manufact in Poland, including fine (writing and printi grades which require prior deinking of prin wastes. Economic gains from reclaimed fi usage may be partly offset by high effluent po tion loads in deinking mills, demanding bet waste water purification. Investigations show that the volume and the BOD load of efflue from deinked pulp stock increases from newspr to mixed wastes to wood-fence (groundwood-fr waste paper. White water from the production paperboard containing 10% of deinked wa paper fibers held 51% more suspended solids a 61% higher 5-day BOD than did ordinary boa machine white water. Available data indicate t waste water from paper mills using reclaimed fi will require extensive biological treatment in ad tion to present mechanical methods. (Stapins IPC)
W74-12972

BUOYANT FORCED-PLUMES IN CRO FLOW,
McGill Univ., Montreal (Quebec). Dept. of Ci Engineering and Applied Mechanics.
For primary bibliographic entry see Field 8B.
W74-12978

HE DEPOSITION OF SULPHUR IN THE AINWATER IN NORTHERN NIGERIA,
stitute for Agricultural Research, Zaria igeria).
R. Bromfield.
llus, Vol 26, No 3, p 408-411, 1974. 3 fig, 1 tab, 9 f.

escriptors: *Fallout, *Sulphur, *Data collec-ns, *Surveys, Monsoons, Air pollution, *Rain ter.
entifiers: *Nigeria, Atmospheric sulphur, Har-ttan.

e concentration and amounts of SO4-S were easured at eleven sites, situated between 350 and 0 kilometres from the sea, during the rainy asons in 1970 and 1971 in Northern Nigeria. In th years, concentrations showed a similar pat-n at each site, being greatest at the beginning d end and smallest at the peak of the rains. The esence of anthropogenic atmospheric-S at the rt of the rains, and of harmattan dust and lower ecipitation at the beginning and end of the rains count for the concentration pattern observed. nounts of S deposited ranged from 0.49-1.89, an 1.14 kg S/ha. An estimate of dry deposition S was made from the intercept on the y axis of a ot of amount deposited against rainfall. The dry position rates were 0.26 times 10 to the minus th power and 0.43 times 10 to the minus 12th wer g S/sq cm/s. (Humphreys-ISWS)
74-12980

VIRLING SHALLOW SUBMERGED TURBU-NT PLUMES,
olorado Univ., Boulder. Dept. of Aerospace En-neering Science.
P. Narain.
urnal of the Hydraulics Division, American ciety of Civil Engineers, Vol 100, No HY9, oceedings Paper 10820, p 1229-1243, September 74. 4 fig, 1 tab, 16 ref, 2 append.

escriptors: *Free surfaces, *Thermal pollution, ubsurface flow, *Jets, Mathematical models, oyancy, Density, Temperature, Velocity, Tur-lent flow, *Path of pollutants.
entifiers: *Submerged jets, *Swirling axial jets, omentum, Flow establishment, Richardson mber.

mathematical model, using method of images d flux conservation equations, was developed to vestigate the flow field produced by a swirling me near a free surface. Various degrees of swirl d various depths of jet submergence were stu-d. The maximum axial velocity, swirl velocity, d the temperature excess loci migrated towards free surface downstream from the orifice. The e of migration towards the free surface in-eased for axial velocity, temperature excess, d the swirl velocity loci taken in ascending der. Increased initial swirl reduced the spread of jet in the axial or downstream direction. The ximum temperature excess also occurred closer the jet orifice with increased swirl. This was ieved at the exposure of increased lateral read of the plume. Increased submergence of jet resulted in increased lateral and longitu-al spread of the plume. (Adams-ISWS)
74-12989

IREX: AN UNRECOGNIZED CONTAMINANT F FISHES FROM LAKE ONTARIO,
nada Centre for Inland Waters, Burlington ntario).
r primary bibliographic entry see Field 5A.
74-12990

IEMICAL WATER TYPES AND THEIR DIS-IBUTION IN SPACE AND TIME IN THE AM-ERDAM DUNE-WATER CATCHMENT AREA ITH ARTIFICIAL RECHARGE,
ije Universiteit, Amsterdam (Netherlands). t. of Earth Sciences.

For primary bibliographic entry see Field 4B.
W74-13004

AN OBSERVATION OF RAPID THERMOCLINE FORMATION IN THE MIDDLE-ATLANTIC BIGHT,
Delaware Univ., Newark. Coll. of Marine Studies.
T. D. Myers.
Estuarine and Coastal Marine Science, Vol 2, p 75-82, 1974. 3 fig, 2 tab, 10 ref.

Descriptors: *Delaware, *Coasts, *Waste disposal, *Density stratification, Continental shelf, Mixing, Salinity, Thermal stratification, Temperature, Isotherms, *Thermocline.
Identifiers: Expendable bathythermograph system.

A time-series temperature profile was constructed from expendable bathythermograph system drops made during the spring of 1973 at an industrial waste disposal site off the coast of Delaware. Isothermal conditions were found throughout the water column until mid-April. Surface warming was sudden and accomplished without detectable return to isothermy. Thermocline formation is attributed to a combination of vernal warming and influx of a warm water mass from the southeast. No appreciable deepening of the thermocline was observed in the month following its formation. The rate of near-surface warming was greatly reduced after thermocline formation. Short-term incursions of warm bottom water were observed on two occasions, one before thermocline formation and one after thermal stratification. Density stratification in the area is primarily thermally induced in the period following thermocline formation. (Yang-ISWS)
W74-13005

METHYLMERCURY: BACTERIAL DEGRADATION IN LAKE SEDIMENTS.
Midwest Research Inst., Kansas City, Mo.
W. J. Spanger, J. L. Spigarelli, J. M. Rose, and H. M. Miller.
Science (Wash DC). 180(4082): 192-193. Illus. 1973.

Descriptors: *Mercury, Lakes, Sediments, Spectrometers, Mass spectrometry, *Gas chromatography, Bacteria.
Identifiers: *Methymercury.

During the first 50 days of a long-term period of incubation of lake sediments with inorganic mercury (Hg2+), low concentrations of methylmercury were observed to build up. Upon continued incubation there was a rapid decrease in amount of methylmercury in the system and a concomitant evolution of volatile inorganic mercury (Hg0). Transfer to the mixed culture to growth media containing methylmercury resulted in the degradation of methylmercury and the volatilization of Hg0. Bacterial isolates were obtained from the mixed culture which, in pure culture, rapidly degraded methylmercury to methane and Hg0. The presence of methane in head space gases was confirmed by flame-ionization gas chromatography, and the presence of Hg0 in head space gases was confirmed by mass spectrometry.--Copyright 1973, Biological Abstracts, Inc.
W74-13038

EPIZOIC ALGAE IN SEWAGE WATERS, (IN RUSSIAN),
Kharkov State Univ. (USSR).
A. M. Matvienko.
Gidrobiol Zh. Vol 8, No 2, p 56-62, 1972. English summary.
Identifiers: *Algae, Characiochloris, Chlorangiopsis, Chlorobion, Colacium, Gloxidium, Hyaloraphidium, Korshikoviella, Rhopalosolen, *Sewage, *Epizoic algae, Self-purification.

Specific and intraspecific taxa of 27 epizoic algae found in sewage waters were discussed. This number included 1 taxon of Euglenophyta (Colacium vesiculosum) and 26 taxa of Protococcineae: Korshikoviella (10), Hyaloraphidium (6), Chlorangiopsis (5), Characiochloris (2), Rhopalosolen (2), Gloxidium (1) and Chlorobion (1). The algae can endure considerable contamination. Developing in mass, they play an important role in sewage self-purification.--Copyright 1974, Biological Abstracts, Inc.
W74-13041

CONTAMINATION OF CHANNEL CATFISH WITH DIELDRIN FROM AGRICULTURAL RUNOFF,
Iowa Cooperative Fisheries Research Unit, Ames.
For primary bibliographic entry see Field 5C.
W74-13050

EFFECTS OF OFFAL DISPOSAL FROM ANIMAL PROCESSING PLANTS ON WATER QUALITY AND AQUATIC LIFE OF NATURAL STREAMS,
Mississippi State Univ., State College. Dept. of Wildlife and Fisheries.
For primary bibliographic entry see Field 5C.
W74-13053

MICROBIAL CO-OXIDATION OF HALOGENATED AROMATIC COMPOUNDS,
Rhode Island Univ., Kingston. Dept. of Plant Pathology-Entomology.
R. W. Traxler.
Completion Report, July 1974, 4 p. OWRT A-045-RI(1). 14-31-0001-3840.

Descriptors: Halogenated pesticides, Pollutant identification, Oxidation, Pesticides, Bacteria, *Microbial degradation, Isolation, Aromatic compounds, Chlorinated hydrocarbon pesticides, Gas chromatography, Separation techniques.
Identifiers: *Co-oxidation, Enrichment techniques.

Bacteria have been isolated by enrichment techniques which utilize sodium benzoate, indene and diphenylethane. Some of these isolates growing on the isolation substrate with heptachlor or DDT present have shown by respirometeric methods to co-oxidize the chlorinated aromatic compound. Gas chromatographic analyses have indicated the oxidation of heptachlor in these systems.
W74-13057

RECENT SOCIOLOGICAL CONTRIBUTIONS TO WATER RESOURCES MANAGEMENT AND DEVELOPMENT,
Kentucky Univ., Lexington. Center for Developmental Change.
For primary bibliographic entry see Field 6B.
W74-13064

CADMIUM CONTENT AND DISTRIBUTION IN THE MUD, BLOOD CLAMS, FISH FLESH AND THE ALGA, PORPHYRA TENERA, IN THE ARIAKE BAY (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Dept. of Fisheries Chemistry.
S. Ishio, N. Ohba, Y. Tanaka, and S. Tadokoro.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 39, No 6, p 705-712, June, 1973. 7 fig, 4 tab, 7 ref. (English summary).

Descriptors: *Cadmium, *Public health, *Bottom sediments, Metals, Water pollution sources, Food chains, Algae, Fish, Zinc, Industrial wastes, *Path of pollutants, Toxicity, Absorption, Adsorption.
Identifiers: Blood clams, Porphyra tenera, *Japan(Ariake Bay).

Ariake Bay has been polluted by cadmium from the wastes of zinc metallurgical plants of Ohmuta. Analysis of cadmium content revealed that contamination of bottom mud was developing from the river mouth of Ohmuta to almost all waters in the bay. The cadmium content in the dry mud ranged from 0.4 to 15 ppm. Based on an upper safety limit of 0.3 mg/day/person of cadmium, it was calculated that the intake of shucked blood clams should be restricted to 90-300 g/day/person. On the other hand, no cadmium was detected substantially in fish flesh and it was therefore considered harmless. Cadmium in Porphyra tenera ranged from 0.3 to 4 ppm dry matter. This suggests no cause for concern, because the quantity of this alga taken as food in a day is not sufficient to result in a large intake of cadmium. (Katz)
W74-13073

PCB CONTENTS IN MARINE ANIMALS IN TOKYO BAY, (IN JAPANESE),
Tokai Regional Fisheries Research Lab., Tokyo (Japan).
For primary bibliographic entry see Field 5C.
W74-13083

DISTRIBUTION OF BOTTOM FISHES IN RELATION TO OXYGEN CONTENTS IN THE BOTTOM WATER OR OMURA BAY, (IN JAPANESE),
Nagasaki Prefecture Fisheries Experiment Station (Japan).
For primary bibliographic entry see Field 5C.
W74-13086

PROBLEMS WITH DUMPING OF RED MUD IN SHALLOW WATERS. A CRITICAL REVIEW OF SELECTED LITERATURE,
Bundesforschung sanstalt fuer Fischerei, Hamburg (West Germany). Institut fuer Kuesten- und Binnenfischerei Isotopenlaboratorium.
For primary bibliographic entry see Field 5C.
W74-13091

ORGANOCHLORINE RESIDUES, MERCURY, COPPER AND CADMIUM IN YELLOW PERCH, WHITE BASS AND SMALLMOUTH BASS, LONG POINT BAY, LAKE ERIE,
Ontario Ministry of Natural Resources, Port Dover.
For primary bibliographic entry see Field 5C.
W74-13093

ACCUMULATION OF SR IN MARINE ORGANISMS- I. STRONTIUM AND CALCIUM CONTENTS, CF AND OR VALUES IN MARINE ORGANISMS,
National Inst. of Radiological Sciences, Chiba (Japan). Dept. of Environmental Contamination.
For primary bibliographic entry see Field 5C.
W74-13098

ON THE EFFECTS OF DUMPED ORGANIC INDUSTRIAL WASTE DERIVING FROM THE PRODUCTION OF PROTEOLYTIC ENZYMES ON DENSITY, DISTRIBUTION AND QUALITY OF FISH AND SHRIMPS,
Ministere de l'Agriculture, Ostend (Belgium). Sea Fisheries Research Station.
For primary bibliographic entry see Field 5C.
W74-13102

RADIATION DATA-WATER.
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-13111

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE QUAD-CITIES STATION, CORDOVA, ILLINOIS, JULY 1968.
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W74-13112

SURVEY OF MERCURY USAGE BY AGENCIES OF THE UNITED STATES GOVERNMENT DURING 1971,
Oak Ridge National Lab., Tenn.
W. E. Clark.
Available from NTIS, Springfield, Va 22161 as ORNL-NSF-EATC-4; $6.25/copy, $2.25/microfiche. Report No ORNL-NSF-EATC-4, March 1974. 172 p, 2 tab, 3 ref, 4 append.

Descriptors: *Mercury, *Surveys, Statistical methods, *Federal government, *Waste disposal, Waste dumps, Data collections, Metals, Chemicals, Industrial production, Industrial wastes, Heavy metals.

Twenty-three major agencies of the U.S. Government were questioned relative to the quantities of mercury used, usage patterns, amounts recovered and recycled, and final disposal practices. Of these major agencies eight reported negligible usage, twelve submitted essentially complete questionnaires, two submitted limited responses and one promised a limited response which has not been received. Six hundred and seventy-nine responses were obtained from individual sites or subagencies. Total mercury accounted for was 101,150 lb of which 71,580 was used as metal, 2880 in chemicals and 26,690 in manufactured items. The total usage amounts to less than 3% of the reported national usage in 1971. About 270 sites recover or recycle mercury to some extent. The amount reported (a minimum) was 30,710 lb, about 30% of the total usage. A few sites submitted details of their antipollution and recycle procedures. Most sites landfill their solid wastes; some segregate mercury-containing waste for burial in isolated areas. Detailed data for each site reporting are summarized. (Houser-ORNL)
W74-13113

ENVIRONMENTAL MONITORING AT ARGONNE NATIONAL LABORATORY: ANNUAL REPORT FOR 1973,
Argonne National Lab., Ill. Occupational Health and Safety Div.
J. Sedlet, N. W. Golchert, and T. L. Duffy.
Available NTIS, Springfield, Va 22161 as ANL-8078; $4.75/copy, $2.25/microfiche. Report No ANL-8078, March 1974. 85 p, 5 fig, 32 tab, 24 ref, 4 append.

Descriptors: *Monitoring, Environment, *Environmental effect, *Radioactivity, *Nuclear powerplants, *Effluents, *Streams, Toxins, Chemicals, Measurement, Assessment, Safety, Evaluation, Air pollution, Water pollution, Soil contamination, Vegetation, Absorption, Milk, Fallout, *Illinois.
Identifiers: Argonne site(Ill), Sawmill Creek(Ill), *Des Plaines River(Ill).

The Argonne National Laboratory conducts a continuous environmental monitoring program on and near the Argonne site whose primary purpose is to determine the magnitude, origin, and identity of any radioactive or potentially toxic chemical substance present in the environment. The results of the environmental monitoring program at the Laboratory for 1973 are presented and discussed. To evaluate the effect of Argonne operations on the environment, measurements were made for a variety of radionuclides in air, surface water, Argonne effluent water, soil, grass, benthos, and milk; for a variety of chemical constituents in surface and Argonne effluent water; and of the environmental penetrating radiation dose. Sample collections and measurements were made both on and off the Argonne site for comparison purposes. The results of the program are interpreted in terms of the sources and origin of the radioactive an chemical substances (natural, fallout, Argonn and other) and are compared with accepted e vironmental quality standards. (Houser-ORNL)
W74-13114

THE DISTRIBUTION OF PLUTONIUM I LIQUID WASTE DISPOSAL AREAS AT LO ALAMOS,
Los Alamos Scientific Lab., N. Mex.
T. E. Hakonson, L. J. Johnson, and W. D. Purtymun.
Available from NTIS, Springfield, Va 22161 LA-UR-73-1309, $3.25/copy, $2.25/microfiche. I 3rd International Congress of the Internation Radiation Protection Association Meetin Washington, D.C., September 9, 1973. Conferen 730907-13. Report No LA-UR-73-1309, 1973. 6 p, fig, 2 tab, 6 ref.

Descriptors: *Plutonium, *Distribution, *Was disposal, *Liquid wastes, *Assay, Ecology, Sed ments, Water, Vegetation, Rodents, Surfa waters, Groundwater, Streams, Soils, *New Me ico.
Identifiers: *Mortandad Canyon(N Mex).

An ecological investigation of plutonium in t Los Alamos Scientific Laboratory environs described. Data are presented on the distributi of plutonium in the alluvial sediments, wate vegetation and rodents from Mortandad Canyo an area which has been used for liquid was disposal for 10 years. The plutonium content of sample materials except rodents was sufficient reduce the relative standard deviations of t determination to less than 30% (based on counti statistics). However, the generally low levels plutonium in rodent tissues in combination wi the small sample masses resulted in relative sta dard deviations usually greater than 30%. (House ORNL)
W74-13117

THE INTERAGENCY CONFERENCE ON TH ENVIRONMENT - A POST-CONFERENCE SU VEY,
California Univ., Livermore. Lawrence Live more Lab.
For primary bibliographic entry see Field 6G.
W74-13118

TRANSURANIC SOLID WASTE MANAG MENT RESEARCH PROGRAMS - QUARTERL REPORT, OCTOBER-DECEMBER 1973.
Los Alamos Scientific Lab., N. Mex.
Available from NTIS, Springfield, Va. 22161 LA-5614-PR; $4.25/copy, $2.25/microfiche. R port No LA-5614-PR, May 1974. 59 p, 10 fig, tab, 50 ref.

Descriptors: *Management, *Radioactive waste *Reviews, *Solid wastes, *Plutonium, Was storage, Corrosion, Waste treatment, Safet Evaluation, Assay, Assessment, Abiotic enviro ment, Biota, Transport, Biology.
Identifiers: Radiolysis, Waste burial, Organ dos *Transuranics.

A review is presented of the progress for thr transuranic solid waste management research pr grams funded by the AEC Division of Was Management and Transportation during the peri of October-December 1973. The interim stora criteria, which were reviewed by AEC administr tive and contractor personnel, will be revised a submitted to AEC Headquarters for further co ment. The experimental conditions for the studi of corrosion in humid air have been revised better simulate conditions expected in closed-p storage. In addition to bare mild-steel and sta less-steel samples, mild-steel coupons coated wi several rust-inhibiting compounds are being st died. Radiolysis studies of typical waste materi contaminated with 238Pu have thus far produc

tween 0.56 and 41.01 kPa of gas per simulated ar. Waste sorting studies are being used to eval- te the newly developed Multi-Energy Gamma say System (box counter). Incinerator type and sign feed rate have been selected for the ansuranic-Contaminated Solid Waste Treatment velopment Facility, and operational parameters ected. The risk analysis method to be used in evaluation of past burial practices has been scribed. Several parameters have been evalu- d from literature sources, and equations to esti- te organ doses have been derived. A lionuclide inventory of Los Alamos Scientific boratory (LASL) disposal area has been com- ed. (Houser-ORNL)
74-13120

URLY AVERAGE CONCENTRATIONS OF LLUTANTS DUE TO POINT EMISSIONS AR TO THE GROUND - A PROBABILISTIC PROACH,
mmissariat a l'Energie Atomique, Paris rance).
r primary bibliographic entry see Field 5A.
74-13124

LEASES OF RADIOACTIVITY IN EF- UENTS AND SOLID WASTE FROM CLEAR POWER PLANTS IN 1972.
k Ridge National Lab., Tenn. Nuclear Safety ormation Center.
clear Safety, Vol 15, No 3, p 311-316, May- ne, 1974. 10 tab, 5 ref.

scriptors: *Monitoring, *Radioactivity, adioactive waste disposal, *Management, ssessment, *Effluents, Streams, *Nuclear werplants, Regulation, Gases, Liquid wastes, lid wastes, Data collections, Public health, search and development.

ring the operation of nuclear power reactors, lioactive materials are produced by fission of nuclear fuel and by neutron interaction with tals and materials in reactor systems and impu- es in reactor coolant water. A small fraction of se radioactive materials enters the plant's ste systems and is channeled into various ef- ent streams. Presented is a tabulation of lioactivity in effluents and solid waste from clear power plants for calendar year 1972. The a included are those reported by the licensee cept for certain calculations made by the AEC gulatory Staff. A similar report was made for 71. The radioactivity in effluents from licensed clear power plants has generally been low in mparison with the limits set forth in the U.S. omic Energy Commission's 10 CFR, Part 20, ndards for Protection Against Radionuclides. ouser-ORNL)
74-13125

PROPOSED INTERIM STANDARD FOR PLU- NIUM IN SOILS,
s Alamos Scientific Lab., N. Mex.
W. Healy.
ailable NTIS, Springfield, Va 22161 as LA- 33-MS. $5.75/copy, $2.25/microfiche. Report No -5483-MS, January 1974. 101 p, 17 fig, 23 tab, ref, 3 append.

scriptors: *Standards, *Plutonium, *Fallout, ir pollution, *Water pollution, *Soil contamina- n, *Soil contamination effects, Human popula- n, Toxicity, Food chains, Public health, Con- l, Human diseases.
ntifiers: Cancer.

rrent standards for controlling health effects m plutonium in the body are discussed. Availa- information on possible sources of exposure of ople living in an area where the soils are con- minated with plutonium is analyzed to arrive at imates of intake. From these estimates, a commended interim standard for the upper limit of concentration of plutonium in the soils in inhabited areas is derived. The recommendation is based upon conservative assumptions where information is lacking and further studies should result in revision. Resuspension, deposition velocity of particles and effectiveness of radioactive particulates in producing lung cancer are discussed. (Houser-ORNL)
W74-13136

THE MATHEMATICAL MODELING OF SOIL-WATER-NITROGEN PHENOMENA,
Oak Ridge National Lab., Tenn.
F. J. Endelman, G. E. P. Box, J. R. Boyle, R. R. Hughes, and D. R. Keeney.
Available from NTIS, Springfield, Va 22161 as EDFB-IBP-74-8. $4.25/copy, $2.25/microfiche. Report No EDFB-IBP-74-8, July 1974. 75 p, 19 fig, 10 tab, 34 ref.

Descriptors: *Model studies, *Mathematical models, *Soil moisture, *Desorption, *Retention, Hydraulic conductivity, Pores, Soils, Loam, Sands, Forest soils, Heating, Ammonification, Nitrification.
Identifiers: Pore size distribution theory, Immobilization.

A non-linear mathematical model is developed for the characteristic curve of soil moisture desorption. The four parameters in the model are estimated from moisture retention data of a Wisconsin Plainfield loamy sand. The unsaturated hydraulic conductivity of water in this soil is calculated with this model and an equation based on pore size distribution theory. These estimates are compared with field data on the same soil. Results are also reported for a study of the ammonification, immobilization, and nitrification of nitrogen in a forest soil. Data for building linear models of these three transformations were obtained from 27 factorial experiments in which intact soil cores were incubated at different temperatures after treatment with aqueous mixtures of NH4-N and NO3-N in variable concentrations. (Houser-ORNL)
W74-13138

DEPOSITION OF RIVER SILTS IN THE RHINE AND MEUSE DELTA,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
H. L. Golterman.
Freshwater Biol. Vol 3, No 3, p 267-281. 1973. Illus.

Descriptors: *Silts, Sediments, Mud, *Rivers, Estuaries, Lakes, Water pollution, Pollutants, Path of pollutants, Pollutant identification, Water pollution sources, Fertilization, Leaching, Erosion, Deltas, Flocculation, Salinity, Sediment transport.
Identifiers: Calcium carbonate, *Meuse River, Netherlands, *Rhine River.

Due to erosion and leaching the rivers contain considerable quantities of silt (mud). It is estimated that the Rhine carries a mean value of 60-70 g/cu m; the variation of the mud content as a function of water discharge shows values up to several hundreds of grams/cu m. The annual supply of mud from these sources is around 4 million tons of dry matter. Near the river mouth, changes in water current velocity and other water movements result in deposition of the river silts. A further important factor is the change in salinity, which causes flocculation and deflocculation. The large deposits of the Rhine silt are rather fertile, which has a great influence on the growth of both the rooted and the suspended vegetation. Enormous amounts of peat can be found as layers formed in periods of a relatively low sea level, in which the sediments were comparatively dry. Due to a temporary elevation of the sea level, new layers of silt were formed on top of the peat. Originally only lands that fell dry during low sea level were reclaimed; later on, lands a few meters below sea level were reclaimed. Lakes were formed mostly by human action; in the older days peat digging, and now sand digging have created large but shallow lakes, of which the water is more or less standing groundwater. The water may still contain a large quantity of humic acids from the remaining peat. Due to the influence of the sea deposits, CaCO3 is also present in large amounts. These factors together render the lake waters rich in humus and alkaline (pH 7-10). Most of the lakes serve as reservoirs for the surrounding agricultural areas. The water movement in spring and summer is therefore opposite to that in fall and winter. This fact and the short renewal times of these lakes cause large chemical and biological changes in which the influence of the sediments on the chemistry of the overlying water plays an important role--Copyright 1974, Biological Abstracts, Inc.
W74-13155

QUANTITY OF BACTERIA AND DESTRUCTION OF ORGANIC MATTER IN BOTTOM DEPOSITS OF THE SARATOV WATER STORAGE BASIN (IN RUSSIAN),
N. E. Yarushek.
Gidrobiol Zh. Vol 9, No 1, p 83-85. 1973. Illus.
Identifiers: *USSR(Saratov River basin), *Biodegradation, Bacteria, Microorganism, Oxygen, Saprophyte, *Organic matter, *Benthos, *Denitrification.

Microbiological investigations of benthic sediments in the Saratov Water Basin (USSR) revealed a total microorganism count reaching 2 x 10 to the 9th power/g with especially high values in slime; a saprophyte count of 562,000/g, a phenol-degrading bacteria count of 393,000/g, a denitrifying bacteria count of 2000/g and O2 consumption values reaching 441 mg of O2/cu m/day. Intense, mainly aerobic degradation of organic matter within the surface layer of the benthic sediment was determined.--Copyright 1974, Biological Abstracts, Inc.
W74-13156

CHARACTERISTICS OF BACTERIA IN WATER LAYERS OF THE SOUTH BAIKAL, (IN RUSSIAN),
G. A. Goman.
Gidrobiol Zh. Vol 9, No 1, p 85-88. 1973. Illus.
Identifiers: *Bacteria, *Eubacteriaceae, *Mycobacteriaceae, *USSR(Lake Baikal).

A study of the seasonal and vertical distribution of microorganisms in the South Baikal (USSR) revealed maximum populations and biomasses within the upper 50 m layer of water during May, June and Sept. and minimum counts in Nov. Cocci, predominant in the surface layer, give way to bacilli, Mycobacteriaceae and Eubacteriaceae in deeper layers.--Copyright 1974, Biological Abstracts, Inc.
W74-13157

THE RELATIONSHIP BETWEEN SEWERS, ENVIRONMENTAL POLLUTION AND BACTERIA THAT ARE RESISTANT TO ANTIMICROBIAL AGENTS, (IN AFRIKAANS),
National Inst. for Water Research, Pretoria (South Africa).
W. O. K. Grabow.
Tydskr Natuurwet. Vol 13, No 2, p 96-99. 1973. English summary.
Identifiers: *Bacteria, *Human diseases, Drugs, *Sewers, *Pathogenic bacteria, Public health.

The therapeutic value of antimicrobial drugs is diminishing due to the rapid increase of resistant bacteria. Initially the problem was limited to bacteria with chromosomal mutations which provide resistance to low concentrations of one antimicrobial drug. Today, however, bacteria carrying R factors (small nucleic acid elements) which confer resistance to high concentrations of a spectrum of antimicrobial drugs, are of exceeding im-

portance. Normal inhabitants of the digestive tract can transfer these factors to pathogenic organisms. Bacteria carrying R factors are abundantly present in sewage from where increasing numbers reach water sources like rivers, dams and even beaches. Steps are needed to protect man and animals against these bacteria which render antimicrobial treatment of many diseases ineffectual.--Copyright 1974, Biological Abstracts, Inc.
W74-13158

LEPTOSPIRES FROM WATER SOURCES AT DIXON SPRINGS AGRICULTURAL CENTER,
Illinois Univ., Urbana. Coll. of Veterinary Medicine.
For primary bibliographic entry see Field 5A.
W74-13160

NITROGEN TRANSFORMATIONS AND AVAILABILITY OF AN ANAEROBICALLY DIGESTED SEWAGE SLUDGE IN SOIL,
Wisconsin Univ., Madison. Dept. of Soil Science.
J. A. Ryan, D. R. Keeney, and L. M. Walsh.
J Environ Qual. Vol 2, No 4, p 489-492. 1973.

Descriptors: Sludge, *Sewage sludge, Soils, Loam, Sands, Nitrification, Denitrification, Chemical analysis, *Aerobic treatment, Water treatment, Waste treatment, Nitrogen, Fertilizers, Nitrogen compounds.

Samples (50 g) of Warsaw sandy loam soil (Typic Argiudoll) were incubated under aerobic conditions with varying levels of an anaerobically digested sewage sludge (up to 1880 ppm N on an oven-dry soil basis). Total N, NH4-N, (NO3+NO2)-N, NH3 volatilization, and hydrolyzable forms of N were determined periodically during 16 wk of incubation at room temperature (23 plus or minus 3 degrees). At low levels (less than or equal to 235 ppm N), the inorganic N was all converted to (NO3+NO2)-N while at the higher levels (greater than or equal to 940 ppm N), a significant amount of NH4-N was not nitrified even after 16 wk of incubation. Recovery of added N was nearly quantitative at the low levels of sewage sludge addition. However, at the higher levels, there was evidence of concurrent nitrification-dentrification. The hydrolyzable N distribution results indicated that very little of the hydrolyzable N was mineralized at the low rates of application. At the high rates of application, apparent development of anaerobic conditions led to more rapid mineralization of the sewage sludge organic N than was found under aerobic conditions. From 4 to 48% of the organic N in the sewage sludge was mineralized to (NO3+NO2)-N in 16 wk. The availability of sewage sludge organic N must be considered when evaluating the potential of the material as a fertilizer or a possible source of NO3-N to ground waters.--Copyright 1974, Biological Abstracts, Inc.
W74-13163

SOLUBILIZATION OF HYDROCARBONS BY THE DISSOLVED ORGANIC MATTER IN SEA WATER,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5D.
W74-13166

DISTRIBUTION OF CHLORINATED HYDROCARBONS IN STREAM-BOTTOM MATERIAL,
Geological Survey, Menlo Park, Calif.
D. F. Goerlitz, and L. M. Law.
Journal of Research, US Geological Survey, Vol 2, No 5, p 541-543, September-October, 1974. 8 tab, 13 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Bottom sediments, *Particle size, *Path of pollutants, Suspended load, Bed load, Distribution patterns, Sampling, Sorption.

Six stream-bottom samples, contaminated in situ with high levels of chlorinated hydrocarbons, were size graded, and the separates were analyzed. The contaminants were found distributed throughout the sample. The complexity of bottom-material samples is such that the distribution of chlorinated hydrocarbons may be controlled to a major extent by the organic matter and associated organisms. All particle-size fractions must be considered if representative samples are to be taken and quantitatively related to a stream. (Knapp-USGS)
W74-13183

RECONNAISSANCE STUDY OF SELECTED NUTRIENTS, PESTICIDES, AND TRACE ELEMENTS IN THE EEL, SALINAS, AND SANTA ANA RIVERS, CALIFORNIA, OCTOBER 1971 THROUGH JULY 1972,
Geological Survey, Menlo Park, Calif.
G. A. Irwin, and M. Lemons.
Water-Resources Investigations 16-73, March 1974. 55 p, 6 fig, 15 tab, 15 ref, 3 append.

Descriptors: *Nutrients, *Pesticides, *Trace elements, *California, Water quality, Rivers, Sampling, Water pollution sources, Path of pollutants.
Identifiers: Eel River(Calif), Salinas River(Calif), Santa Ana River(Calif).

Nutrients, trace elements, and pesticide compounds were in low concentrations in the Eel River and were somewhat higher in parts of the Salinas and Santa Ana Rivers, California. Nitrate and orthophosphate ranged from a maximum of 0.3 mg/liter and 0.11 mg/liter in the Eel River to a maximum of 9.1 mg/liter and 13 mg/liter in the Santa Ana River. Concentrations of trace elements in the Eel River were generally low or below detectable limits, while these same trace elements were usually present in higher concentrations in most parts of the Salinas and Santa Ana Rivers. Pesticide compounds were not detected in the Eel River in either the water or bottom sediment, whereas in the Salinas and Santa Ana Rivers pesticide compounds were detected in both the water and bottom sediment. The concentrations were quite different between sampling sites within individual rivers. Within-river differences in concentrations were the most noticeable in the Salinas and Santa Ana Rivers. Most of the variability in these rivers was probably the result of sewage effluent and agricultural return water. (Knapp-USGS)
W74-13195

SUMMARY GROUND-WATER RESOURCES OF BEAVER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13200

SUMMARY GROUND-WATER RESOURCES OF WASHINGTON COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13201

SUMMARY GROUND-WATER RESOURCES OF WESTMORELAND COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13202

SUMMARY GROUND-WATER RESOURCES OF BUTLER COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13203

SUMMARY GROUND-WATER RESOURCES OF ALLEGHENY COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13204

SUMMARY GROUND-WATER RESOURCES OF ARMSTRONG COUNTY, PENNSYLVANIA,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 4B.
W74-13205

CHANGES IN SEDIMENT LOADS IN RIVERS OF THE ATLANTIC DRAINAGE OF THE UNITED STATES SINCE 1900,
Geological Survey, Woods Hole, Mass.
R. H. Meade, and S. W. Trimble.
In: Effects of Man on the Interface of the Hydrological Cycle with the Physical Environment, Symposium: International Association of Hydrological Sciences Publication No 113, p 99-104, 1974. 5 fig, 10 ref.

Descriptors: *Sediment load, *Rivers, *Atlantic Coastal Plain, *United States, Sediment yield, Sediments, Reservoirs, Soil conservation, Land use, Sediment transport, Channel erosion, Soil erosion, Erosion control.

Changes in sediment loads in the Atlantic drainage of the United States can be related to construction of reservoirs and changes in land use. Sediment loads have decreased immediately downstream from reservoirs but the persistence of large loads at points farther downstream indicates that the river channels themselves are not being degraded. The decline of crop farming and the improvement of soil-conservation practices have also decreased the sediment yields, but this reflected mainly in the sediment loads of the tributary streams; as yet there has been no corresponding marked decrease in the sediment loads in most of the main-stem rivers. (Knapp-USGS)
W74-13215

P, N:P STANDARDS FOR HAWAIIAN STREAMS,
Hawaii Univ., Honolulu. Water Resources Research Center.
H. K. Gee.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10273, $3.25 paper copy, $2.25 in microfiche. Quality of Coastal Waters, Project Bulletin No 9, Nov 1973. 3 p, 1 tab.

Descriptors: *Water quality standards, *Surface waters, *Hawaii, *Legislation, *Water quality control, Government, State governments, Governmental interrelations, Water pollution control, Water policy, Water law, Water resource development, Streams, Nitrates, Nutrients, Phosphates, Eutrophication, Water management(Applied), Conservation.
Identifiers: Federal Water Pollution Control Amendments of 1972.

One of the program objectives of the Hawaiian State Water Strategy for 1974 is to revise current water quality standards in order to eliminate certain inadequacies and to make them consistent with new federal guidelines. Proposed standards for maximum phosphorus and nitrogen levels in surface waters are unsuitable for fresh surface waters in Hawaii. The standards are based on Environmental Protection Agency guidelines, but are inappropriate for Hawaiian streams, generally because (1) they are exceeded in nature, and (2) the usual concern with high nutrient levels is unnecessary in Hawaii. No Hawaiian streams enter lakes, so there is no effect upon eutrophication, and Hawaiian streams are characteristically steep and fast flowing, thus there is no nuisance plant growth problem. Results of several studies illustrate how these standards are inappropriate. A special classification is suggested which would exempt from the EPA criteria those streams which exceed the proposed standards due to unique natural circumstances. (Deckert-Florida)

4-13217

IMBLE SHOAL CHANNEL (MAINTENANCE EDGING) (FINAL ENVIRONMENTAL IMCT STATEMENT).
ny Engineer District, Norfolk, Va.
primary bibliographic entry see Field 4A.
4-13226

VIRONMENTAL LEAD: A SURVEY OF ITS SSIBLE PHYSIOLOGICAL SIGNIFICANCE,
tish Columbia Univ., Vancouver. Dept. of ological Sciences.
V. Warren.
rnal of Biosocial Science, Vol 6, No 2, p 223-, 1974. 4 tab, 49 ref.

scriptors: *Lead, *Potable water, *Tosicity, il, *Mercury, Metals, Environmental effects, lution, Human diseases, Rural areas, Water lution effects, Water pollution sources.
ntifiers: *Neurological diseases, emyelination, Soil-lead.

hough multiple sclerosis, swayback, scrapie, u, Minamata disease, lead lameness (sheep), tor neurone disease, and amyotrophic lateral erosis are different illnesses, all, with the possi- exception of scrapie, appear to have two com- n denominators: deterioration of the nervous tem, which may or may not include demyelina- n, and a frequently unexplained association h lead or mercury. Sources of lead pollution, in nking water, in food, and in air are discussed. ile rural dwellers in areas of high soil-lead con- t are more apt to absorb the lead through food, r dwellers are more likely to inhale lead parti- s. Other sources of lead and mercury are scribed and evidence linking metallic elements h neurological diseases is postulated. (Prague-RL)
4-13233

INKING WATER AS A SOURCE OF LEAD LLUTION,
sgow Univ. (Scotland). Dept. of Materia dica.
Goldberg.
vironmental Health Perspectives, Vol 7, p 103-, May, 1974. 3 fig, 2 ref.

scriptors: *Potable water, Lead, *Plumbing, oxicity, Path of pollutants, Public health, Water lution effects.
ntifiers: *Glasgow(Scotland), *Soft water, ad-lined drinking water tanks, *Lead poisoning, tabolic effects.

ad poisoning was found in some inhabitants of uses in rural Scotland, exposed to soft water d lead-lined drinking water tanks. Further in- stigations were carried out on the clinical and tabolic effects of lead acquired by drinking soft mestic water from lead plumbing systems in 23 sgow households. The lead content of water m cold taps was up to 18 times the upper ac- ptable limit and was proportional to the amount lead in the plumbing system. The blood lead of inhabitants of these houses showed a significant gative correlation with water-lead content. A all number of clinical abnormalities were found t could not be directly attributed to lead toxicity. e results of the study underline the possibility nger to health of lead plumbing systems in soft ter regions.
74-13234

DIONUCLIDE UPTAKE BY SOME FRESH-ATER HYDROBIONTS, (IN RUSSIAN),
ademiya Nauk Litovskoi SSR, Vilnius. Inst. of tany.
-R. F. Dushauskene-Duzh, E.-D. P. rchyulenene, V. B. Nyanishkene, R. I. uliene, and G. G. Polikarpov.
Liet Tsr Moksiu Akad Darb Ser B. 3 p 201-212, 1972. English summary.
Identifiers: *Carp, Cerium, Cesium, Chironomus, Dreissen, Fish, Food, Hydrobionts, Larvae, Lead, Lymnaea, *Mollusks, Phytoplankton, Ruthenium, Strontium, *Absorption, *Radionuclides.

The accumulation coefficients of Sr90 and Pb210 were the same in fish and molluscs. The accumulation coefficients of Pb210 in plants appeared to be an order lower than those of Sr90. A correlative bond for fish was between the Sr90 and Pb210 concentrations. Sr90, Ce144, Cs137 and Ru106 accumulated in phytoplankton and silt with maximum coefficients. Among different radionuclides Ce144 exhibited the highest accumulation coefficient in hydrobionts. Chironomid larvae assimilated to following amounts of total available radionucleides from radioactive food: Sr90-10%, Cs137-9%, Ce144-11%, Ru106-6%. Yr old carp assimilated 10% of the total available Ce144 from chironomids passed through their gastrointestinal tracts. The uptake of Sr90, Ce144, Cs137 and Ru106 by dreissen and chironomid larvae, Sr90 uptake by Limnaea, Ce144 uptake by yr old carp occurred from the water in low quantities during feeding. In the natural environment fish of different trophic levels (carp and predatory) exhibited the same ability of Sr90 accumulation. The same was true for PB210. The accumulation coefficients of each radionuclide in the fish did not depend on their feeding type.--Copyright 1974, Biological Abstracts, Inc.
W74-13240

TEMPERATURE-TOXICITY MODEL FOR OIL REFINERY WASTE,
Utah Water Research Lab., Logan.
J. H. Reynolds, E. J. Middlebrooks, and D. B. Procella.
Journal of the Environmental Engineering Division, ASCE, Vol 100, No EE3, p 557-576, June, 1974. 3 fig, 12 tab, 54 ref.

Descriptors: *Mathematical studies, *Equations, *Temperature, *Microorganisms, *Toxicity, Testing, Phenols, Algae, Flow, *Model studies, Environmental effects, Reviews, *Oil wastes.

Equations have been developed using chemostat kinetics and enzyme inhibition kinetics to describe the effects of temperature on toxicity to microorganisms. These equations were tested by semi-continuous and continuous flow experiments with phenol and the alga Selenastrum capricornutum. The data obtained were fitted to competitive, uncompetitive, and noncompetitive inhibitor models. Results indicate that phenol exerts a competitive inhibition effect on the growth of the alga. Comparison of the competitive inhibition constants for S. capricornutum exposed to phenol indicates that phenol toxicity increases with an increase in temperature according to the Arrhenius function. (Sandoski-FIRL)
W74-13264

THE HAZARD OF IRON,
Ontario Ministry of the Environment, Toronto. Pollution Control Branch.
F. J Dart.
Water and Pollution Control, Vol 112, No 5, p 19-23, 33, 38, May, 1974. 2 tab, 4 ref.

Descriptors: *Iron, *Water treatment, On-site investigations, Analytical techniques, *Canada, Water pollution control, *Water pollution sources, Aquifers, Water pollution effects, Potable water.

In Ontario, Canada, the Ministry of the Environment has a drinking water objective of only 0.3 mg/liter or less of iron, a limit recommended not on the basis of possible toxicity but rather to avoid the many nuisance problems that arise with excess concentration. Without the proper identification of the sources of the problem iron, remedial measures can become an expensive problem. On the basis of Ministry field investigations, however, considerable progress is being made in identifying and remedying certain iron problem situations. Advances in silicate sequestering and the identification of the problem of interrelationships of iron, organic matter, and a multiple-aquifer water sources are examples of ongoing work. (Sandoski-FIRL)
W74-13269

STATIC LEACHING STUDIES ON PULPWOOD BARK RESIDUES,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
A. H. Benedict, J. J. McKeown, and R. D. Hart.
Journal of the Environmental Engineering Division, ASCE, Vol 100, No EE3, p 529-540, June, 1974. 8 fig, 3 tab, 2 ref.

Descriptors: *Leaching, *Laboratory tests, *Bark, Evaluation, *Water quality, Biochemical oxygen demand, Chemical oxygen demand, Color, Nitrogen, Phosphorus, Water pollution sources.
Identifiers: Bark residues, Bark leaching.

A laboratory study to define and evaluate the characteristics of bark leaching in terms of the types and quantities of materials leached from bark residues has been undertaken with the impact of these extractives on water quality being examined. The quantities of BOD5, COD, color, Kjeldahl nitrogen, and inorganic phosphorus leached from fresh and aged barks under static leaching conditions were determined. Results of these studies show that the quantity of BOD5, COD, color, nitrogen, and phosphores extracted from bark depends on the field storage age of bark and on the characteristics of the water in contact with the bark. The significance of each of these factors is examined subsequently. Based on the results of this study, the following conclusions can be made: potential of bark to leach these variables decreases with storage age in bark piles; under fresh water conditions variable concentrations will increase with increasing contact time, approaching limiting values; and, salt water retards BOD5, COD, color, and Kjeldahl nitrogen leaching from bark. (Sandoski-FIRL)
W74-13276

BIO-DEGRADATION OF NON-IONIC SURFACTANTS-II: BIODEGRADATION ASSESSMENTS (BIODEGRADAZIONE DI TENSIOATTIVINON IONICI. NOTA 2: MISURE DELLA BIODEGRADAZIONE),
Montecantini Edison, Novara (Italy). Instituto di Richerche G. Donegani.
P. Albanese, and R. Capuci.
La Rivista Italiana delle Sostanze Grasse, Vol 51, No 2, p 70-81, February, 1974. 3 fig, 9 tab, 23 ref.

Descriptors: *Biodegradation, *Surfactants, *Phenols, *Alcohols, Analytical techniques, Testing, Measurements, Pollutant identification, Water pollution sources.

Research was performed to determine whether the EMPA test could be used to assess biodegradation in non-ionic surfactants, polyethoxylated alkylphenols, and alcohols using different analytic procedures as appropriate. Standard-error values were discussed for the test and for concentration assessments obtained from surface tension measurements. (Sandoski-FIRL)
W74-13279

PROGRAM WILL CONTROL POLLUTION FROM WATERCRAFT,
Canada Centre for Inland Waters, Burlington (Ontario).
S. Beszedits, and A. Netzer.
Water and Pollution Control, Vol 112, No 6, p 33-34, 36, June, 1974.

Descriptors: *Boats, *Water pollution sources, Waste discharge, *Water pollution control, Treatment facilities, Equipment, Regulation, *Canada.

Pollution from watercraft is particularly acute and noticeable in Canadian inland waters around busy harbors, and in crowded marines. Although considerable efforts have been directed towards curbing such discharges, most vessels still continue to dump their wastes overboard without treatment. Lack of virgorous legislation and lax enforcement of existing regulations are primarily to blame for such conditions. On-board techniques for controlling pollutant discharges are discussed and manufacturers of marine pollution control equipment given. (Sandoski-FIRL)
W74-13295

THE ECONOMIC VALUE OF WATER FOR WASTE DILUTION: REGIONAL FORECASTS TO 1980,
Colorado State Univ., Fort Collins. Dept. of Economics.
S. L. Gray, and R. A. Young.
Journal Water Pollution Control Federation, Vol 46, No 7, p 1653-1663, July, 1974. 5 tab, 12 ref.

Descriptors: *Forecasting, *Waste dilution, Water utilization, United States, Biochemical oxygen demand, *Economics, Estimating equations, Water resources, Optimization.

The procedures and findings of a recent study that developed forecasts of the value of water for diluting wastes in each of several major regions of the United States are presented. The discussion is limited to wastes in terms of biochemical oxygen demand loadings only. The conceptual issues in resource allocation, methods for estimating economic value and the chosen conceptual framework, sources of data, and forecasts of the regional values of dilution water for 1980 are examined. Finally, the conclusions emerging from the analysis are discussed. (Sandoski-FIRL)
W74-13297

THE BIODEGRADATION OF HYDROCARBONS,
U. Fasoli, and G. Genon.
La Chimica E L'Industria, Vol 56, No 3, p 191-195, March, 1974. 7 fig, 3 tab, 8 ref.

Descriptors: *Surface waters, *Self-purification, *Biodegradation, *Mathematical models, Model studies, Hydrocarbons, Numerical analysis, Application techniques.
Identifiers: Monod's equation.

Self-purification of surface water is dependent on the ability of its microorganisms to decompose organic substances, such as hydrocarbons or amines. Evaluation of time for the biodegradation and increase in the bacteria population is thus a priority. Two mathematical models, both based on Monod's growth equation, are presented for the interpretation of experimental results relating to hydrocarbon biodegradation. They differ with respect to their definition of the physical mechanism responsible for transfer of the hydrocarbon from the water to the bacterial mass. The numeric coefficients of the kinetic equations are determined following establishment of the formal structure of the two mechanisms. A comparison is also made between the two models and their possible applications. (Sandoski-FIRL)
W74-13300

INJECTING HIGHLY TREATED SEWAGE INTO A DEEP-SAND AQUIFER,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
S. D. Faust, and J. Vecchioli.
Journal of the American Water Works Association, Vol 66, No 6, p 371-377, June, 1974. 9 fig, 12 tab, 20 ref.

Descriptors: *Water quality, *Water demand, *Urbanization, *Aquifers, *Artificial recharge, Feasibility studies, Water reuse, Sewage disposal, Injection wells, *New York.

The growth in population in Nassau County, L.I., over the past twenty years has greatly increased the demand for water. At the same time, urbanization has reduced the recharge capacity of the local aquifer. In an effort to solve the problem, a series of artificial-recharge experiments are being carried out which examine the feasibility of injecting reclaimed water into a network of wells. The effect on the resultant water quality is discussed. (Sandoski-FIRL)
W74-13310

DEGRADATION OF ORGANIC NITROGENOUS COMPOUNDS BY PSYCHROPHILIC BACTERIA,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-13312

LIQUID SCINTILLATION COUNTING FOR PLUTONIUM IN ENVIRONMENTAL SAMPLES,
Dow Chemical Co., Golden, Col. Rocky Flats Div.
For primary bibliographic entry see Field 5A.
W74-13325

DESIGN, DRILLING AND COMPLETION, OPERATION, AND COST OF UNDERGROUND WASTE DISPOSAL WELLS IN GULF COAST REGION OF TEXAS AND LOUISIANA,
Pollution Control and Waste Disposal, Inc., New Orleans, La.
R. J. Meers.
Underground Waste Management and Artificial Recharge, Vol 1, p 337-345, 1973. 1 fig.

Descriptors: *Underground waste disposal, Effluents, Filtration, *Reservoirs, Exploration, Oil industry, *Groundwater, Disposal, Temperature, Data, Sands, Subsurface investigations, Drilling, Well design, Confined water, Corrosion, Casing, Cements, *Texas, *Louisiana.
Identifiers: Waste stream, *Waste disposal well, Sand parameters.

The first factor to be considered in determining the feasibility of underground waste disposal is the quality of the waste stream. Equally important is the necessity that the effluent by chemically stable, after filtration, under elevated temperature conditions of the injection zone. Once the suitability of the waste stream for underground waste disposal has been determined, the reservoir must be selected. Existing knowledge of the subsurface gained from oil and gas exploration provides enough data to determine a well depth sufficient to penetrate several probable reservoirs. Sand parameters measured in the disposal well permit selection of the most suitable reservoir. Geologic study of the subsurface provides information as to the areal extent and thickness of probable reservoirs. Well design must meet state requirements for protecting surface freshwater sands and confining the waste to the selected reservoir. Drilling and well-completing techniques, including casing and cement selection to meet corrosion-protection needs, should be planned to offer maximum protection against failure of any part of the waste system. (Campbell-NWWA)
W74-13340

SANITARY EVALUATION OF WATER QUALITY IN THE INITIAL OPERATING PHASE OF THE VYACHESLAV RESERVOIR, (IN RUSSIAN),
Meditsinskii Institut, Tselinograd (USSR).
N. I. Ananev, and N. A. Demin.
Gig Sanit, Vol 37, No 7, p 110-111, 1972.

Identifiers: Reservoirs, *USSR(Vyacheslav Reservoir), *Biochemical oxygen demand, Water quality, Sanitary conditions.

Investigations of the water quality changes occurring during the initial phase of operation of the Vyacheslav reservoir (USSR) showed both increased coloration and biological O2 demand during the initial periods due to insufficient cleaning of the bed, and to filling of the reservoir to a fraction of the total capacity.--Copyright 1974, Biological Abstracts, Inc.
W74-13364

HYGIENIC STANDARDIZATION OF THE COMPONENTS OF RUBBER PRODUCTION SEWAGE IN RESERVOIR WATER, (IN RUSSIAN),
Permskii Politekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 5C.
W74-13373

ON THE BEHAVIOR OF OIL PRODUCTS IN SURFACE DEPOSITS AND GROUND WATER, (IN FINNISH),
Geological Survey of Finland, Otaniemi.
P. Lahermo.
Geologi(Helsinki), 8, p 105-110, 1972, Illus. English summary.
Identifiers: Degradation, *Oil pollution, *Groundwater, *Path of pollutants.

With the increase in consumption of oil products, there is considerable risk of oil seeping into ground water. The rate of infiltration into surface deposits depends upon grain size and moisture content of soil, as well as the structure of the beds and the refining grade of the different oils. Detrimental effects depend on how long the oil remains in deposits, as well as on its solubility in water. Light oils are often less harmful than heavy ones which tend to move in soil with difficulty, but do not disintegrate easily. On the ground surface, oils disappear quickly as a result of oxidation and bacterial activity, whereas in anaerobic conditions disintegration is slow. The ground waters in Finland are easily polluted, as the water table is near the surface and the thickness of aquifers is small. To prevent ground waters from becoming polluted by oil, the most important areas of its formation should be protected. The present water law is a step toward pollution control.--Copyright 1973, Biological Abstracts, Inc.
W74-13379

SOME HYDROBIOLOGICAL PROBLEMS OF THE GROUNDWATER ENRICHMENT AT THE BUDAPEST METROPOLITAN WATERWORKS,
Lajos Kossuth Univ., Debrecen (Hungary). Zoological Inst.
For primary bibliographic entry see Field 5C.
W74-13383

DATA ON THE HYDROBIOLOGICAL STATUS OF THE BODROG RIVER BACKWATER AT SAROSPATAK: II. HYDROCHEMISTRY,
Wasser-Kanals. Kamitats Hajdu-Bihar, Debrecen (Hungary).
For primary bibliographic entry see Field 2K.
W74-13385

WATER POLLUTION ASPECTS OF STREET CONTAMINANTS,
Illinois State Univ., Normal. Coll. of Applied Science and Technology.
A. R. Jacobson.
Public Works, Vol 105, No 7, p 84, July, 1974.

Descriptors: *Roads, *Paving, *Cleaning, Water pollution sources, Operation and maintenance, Investigations, Personnel, Training.

Pollutant characteristics of street surface contaminants have been investigated with the following recommendations being made based on the findings. Equipment operators should be trained in how to operate their quipment most efficiently and in knowing what material needs to be removed and where it is most commonly located. Increased effort should be expended on street cleaning operations, in maintaining records, in maintaining pavements, and in the selection of material for paving purposes. Other guidelines for the operation and maintenance of streets are indicated and research areas for future investigation are presented. (Sandoski-FIRL)
W74-13411

ANNUAL ENVIRONMENTAL MONITORING REPORT: CALENDAR YEAR 1973,
Mound Lab., Miamisburg, Ohio.
D. G. Carfagno, and W. H. Westendorf.
Available NTIS, Springfield, Va 22161 as Rept. No. MLM-2142; $3.25/copy, $2.25/microfiche. Report No MLM-2142, April 25, 1974. 37 p, 3 fig, 15 tab, 4 ref, append.

Descriptors: *Monitoring, Environment, Radioactivity, *Sampling, *Analytical techniques, Laboratories, Air, Water, Soils, Foods, Silts, Tritium, Polonium, Plutonium, Assay, Public health, *Ohio.
Identifiers: *Mound Laboratory(Ohio).

The environment surrounding Mound Laboratory was monitored and the results are reported for calendar year 1973. Samples analyzed included air, water, foodstuffs, soil, and silt. For radioactive species, the average concentrations of polonium-210, plutonium-238, and tritium detected were well within the stringent standards adopted by the Atomic Energy Commission and the Environmental Protection Agency. Data concerning nonradioactive species in air and water were also presented. Water monitoring for radioactive species showed the average concentrations of plutonium-238 and tritium measured at the water sampling locations during this period to be less that 0.1% and 0.5% of the respective RCG values. Additionally, data concerning radioactive species in surface water, community drinking water, foodstuffs, and silt are presented. The results of the analyses for the year 1973 are provided. (Houser-ORNL)
W74-13429

ENVIRONMENTAL AND RADIOLOGICAL MONITORING AT THE NATIONAL REACTOR TESTING STATION DURING FY-1973 (JULY 1972-JUNE 1973),
Idaho Operations Office (AEC), Idaho Falls. Health Services Lab.
For primary bibliographic entry see Field 5A.
W74-13431

ENVIRONMENTAL LEVELS OF RADIOACTIVITY AT ATOMIC ENERGY COMMISSION INSTALLATIONS.
Division of Operational Safety (AEC), Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-13432

TRITIUM IN PRECIPITATION AND FRESHWATER SOURCES IN ISRAEL,
Weizmann Inst. of Science, Rehovoth (Israel). Dept. of Isotope Research.
I. Carmi, and J. R. Gat.
Isr J Earth Sci. Vol 22, No 2, p 71-92. 1973 Illus.

Descriptors: *Groundwater, Water sources, Water pollution, Pollutants, *Water pollution sources, Precipitation(Atmospheric), *Tritium, Radioisotopes, Rivers, Europe, Freshwater, Springs, Karst.
Identifiers: *Israel(Jordan River).

Tritium levels in groundwater sources in Israel are generally very low. Exceptions were found in some karst springs and ina basaltic fractured aquifer. An age analysis of the Jordan River sources showed the presence of a seasonal component with water ages of less than 5 yr and a base flow whose tritium ages were in excess of 10 yr. The tritium record in the precipitation from 1958-1971 is also presented.--Copyright 1974, Biological Abstracts, Inc.
W74-13444

SLOW-RELEASE PESTICIDE SYSTEM: POLYMERS OF LACTIC AND GLYCOLIC ACIDS AS ECOLOGICALLY BENEFICIAL, COST-EFFECTIVE ENCAPSULATING MATERIALS,
Battelle Columbus Labs., Ohio.
For primary bibliographic entry see Field 5G.
W74-13445

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA, PART II. BIOLOGICAL INVESTIGATIONS.
Allan Hancock Foundation, University of Southern California: Los Angeles, Calif., 1973, 237p. D. F. Soule and M. Oguri Editors.

Descriptors: *California, Bays, Harbors, *Ecosystems, Wastes, Pollutants, *Industrial wastes, *Water pollution sources, Fish populations, Demersal fish, Fish, Effluents, Liquid wastes, Benthos, Cannaries.
Identifiers: Amino-acids, Engraulis-mordax, *San Pedro Bay(Calif), Anchovy.

This volume concerns biological investigations of San Pedro Bay, California,. After an introductory section discussing such specifics as area description, circulation patterns and productivity, free amino acid variation in the anchovy, Engraulis mordax from the Los Angeles Harbor, is discussed. The roles of microbial activity in the harbor ecosystem are then discussed, followed by coverage devoted to a working report on the dilution of cannery wastes discharged into the Los Angeles Harbor. An annotated bibliography on cannery effluents is included, followed by discussion on the results of 14 benthic trawls conducted in the outer Los Angeles-Long Beach Harbor, California, on May 24, 1972. Coverage of the demersal fish populations of San Pedro Bay is given, followed by an annotated bibliography on the northern anchovy, E. mordax and a discussion on the numerical analysis of a benthic transect in the vicinity of waste discharges in outer Los Angeles Harbor. Numerous illustrations are included throughout and each contribution ends with a list of literature cited.--Copyright 1974, Biological Abstracts, Inc.
W74-13461

OBSERVATIONS ON THE HYDROLOGY AND MARINE ORGANISMS OF THE TIDAL COLORADO RIVER AND ADJACENT WATERS, TEXAS, FEBRUARY-JUNE 1962,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
R. A. Diener.
Contrib Mar Sci. 17, p 99-110, 1973. Illus.

Descriptors: *Texas, Rivers, *Colorado River, *Salinity, Temperature, Aquatic life, Marine animals, Crustaceans, Crabs, Marine fish, Shrimp, Trout, Fish.
Identifiers: Callinectes-sapidus, Ctenophores, Cynoscion-arenarius, Leiostomus-xanthurus, Micropogon-undulatus, Penaeus-aztecus, Croaker, Seatrout.

Salinity and temperature measurements and collections of organisms at 2-wk intervals began in Feb., 1962 and continued through June, 1962 at 10 stations in the tidal Colorado River of Texas and adjacent waters. Surface salinity ranged from 1.0 degrees/00-31.2 degrees/00 and bottom salinity ranged from 10.6 degrees/00-31.2 degrees/00. Surface salinity fluctuated the most in the Colorado River, increasing with flood tide and decreasing with ebb tide while the least fluctuation occurred in East Matagorda Bay, reflecting the reduced influence of tides and high evaporation-precipitation ratio. Surface and bottom salinity differences were the greatest (28.5 degrees/00) in the river and the Gulf Intracoastal Waterway where mixing was slight and the least (8.4 degrees/00) in the bays where mixing was the greatest. Water temperatures (surface and bottom) paralleled the general warming trend of air temperature. Temperatures of bottom waters during February and early March were warmer than those of surface waters, but the situation reversed itself during the remainder of the study. Invertebrates (18 spp.) and vertebrates (39 spp.) were collected. Ctenophores, brown shrimp (Penaeus aztecus) and blue crabs (Callinectes sapidus) were the most abundant invertebrates while the Atlantic croaker (Micropogon undulatus), spot (Leiostomus xznthurus) and sand seatrout (Cynoscion arenarius) were the most abundant vertebrates. Nearly all of the abundant species displayed numerous peaks within the study area during May or June with a corresponding increase of size as the season advanced from Feb.-June.--Copyright 1974, Biological Abstracts, Inc.
W74-13463

GALVESTON BAY BENTHIC COMMUNITY STRUCTURE AS AN INDICATOR OF WATER QUALITY,
Texas Univ., Port Aransas. Marine Science Inst.
For primary bibliographic entry see Field 5A.
W74-13464

BREEDING CALANOIDA AND CYCLOPOIDA (COPEPODA, CRUSTACEA) IN THE WATERS OF THE GUAMA, CAPIM AND TOCANTINS REGIONS, WITH A NOTE ON THE ACCOMPANYING FAUNA, (IN PORTUGESE),
Instituto de Pesca, Parque Fernando Costa, Sao Paulo (Brazil).
For primary bibliographic entry see Field 5C.
W74-13465

DISTRIBUTION OF THE FIDDLER CRABS, UCA PUGNAX AND UCA MINAX, IN RELATION TO SALINITY IN DELAWARE RIVERS,
Millersville State Coll., Pa. Dept. of Zoology.
K. G. Miller, and D. Maurer.
Chesapeake Sci. Vol 14, No 3, p 219-221, 1973.

Descriptors: Rivers, *Delaware, *Crabs, *Salinity, Crustaceans, Saline water, Water pollution sources, Fishing.
Identifiers: *Fiddler crabs, Uca-minax, Uca-pugnax.

The distribution and abundance of the fiddler crabs, Uca pugnax and U. minax were determined in relation to salinity in 3 tidal tributaries of Delaware Bay. Only Uca pugnax was present in high salinity (21-29 0/00) while U. minax was present in lower salinities and even in fresh water. Their distributions overlapped along the salinity gradient and both species were equally abundant in salinities of 8-12 0/00. There was a statistically significant positive association between abundance and salinity for Uca pugnax and a negative association for U. minax.--Copyright 1974, Biological Abstracts, Inc.
W74-13468

AN ECOLOGICAL SURVEY OF THE ALGAE OF HUNTINGTON CANYON, UTAH,
Brigham Young Univ., Provo, Utah. Dept. of Botany and Range Science.
For primary bibliographic entry see Field 5C.
W74-13469

MERCURY CONTENT OF THE MUSSELS (MYTILUS EDULIS) GROWING FREE AND UNDER CULTIVATION IN NORTHWEST SPAIN, (IN SPANISH),
Instituto de Investigaciones Pesqueras, Cadiz (Spain). Laboratorio de Investigaciones Pesqueras.
R. Establier.
Invest Pesq, Vol 37, No 1, p 101-106, 1973, Illus. English summary.

Descriptors: *Mercury, *Mussels, Water pollution sources, Pollutant identification.
Identifiers: Mytilus edulis, *Spain.

Fourteen samples of natural populations and 10 of populations under culture were analyzed. The samples were obtained in different places of the Rias of NW Spain: Vigo, Pontevedra, Arosa, Muyos and Noya. In cultivated mussels, the Hg content in ppm wet weight ranges between 0.06 and 0.14, with the exception of 2 samples from Marin with a content of 0.24-0.28 ppm. These values are below the allowed levels accepted by different countries. Mussels growing in natural habitats show a higher Hg content, perhaps because of their slower growth.--Copyright 1974, Biological Abstracts, Inc.
W74-13493

5C. Effects Of Pollution

DREDGING PROBLEMS AND COMPLICATIONS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
L. S. Slotta.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR 018-74, January 1974, p 39-52. 2 tab, 31 ref.

Descriptors: *Dredging, *Estuarine environment, *Environmental effects, Disposal.
Identifiers: *Dredge spoils.

In the U.S., maintenance dredging and new dredging projects cost over $150 million in 1972 and accounted for the transfer of over 300 million cubic yards and 80 million cubic yards of dredge spoils, respectively. Environmental concerns in relation to dredging have risen due to the relatively fragile nature of estuarine ecosystems and the widespread use of dredging in estuaries. Particular interest has been generated around the two common practices of spoil disposal by either filling marsh lands or dumping in estuarine waters. During a 15 month period, an interdisciplinary team at Oregon State University has conducted research on the environmental impact of estuarine dredging. Results from the study indicate a number of acute environmental impacts including altered circulation, physical removal of organisms, burial of organisms, turbidity, and suspended solids, nutrient release, increased oxygen demand, and released free sulfides, heavy metals and toxic hydrocarbons. Chronic impacts resulting from dredging include particle size change, evolution of resistance biological communities, and increased or decreased sediment turnover. EPA guidelines and potential research requirements for dredging are also discussed. (See also W74-12756) (Schroeder-Wisconsin)
W74-12761

FISH POISONING IN THE EASTERN CARIBBEAN,
Caribbean Research Inst., St. Thomas, Virgin Islands.
R. W. Brody.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 100-116. 2 fig, 1 tab, 16 ref.

Descriptors: *Fish toxins, *Poisons, Bacteria, Degradation(Decomposition), Epidemology, Shellfish, Marine fisheries, Commercial fishing, Toxicity, Systematics.
Identifiers: *Virgin Islands, *Leeward Islands, *Caribbean, Endotoxins, Clupeiotoxism, Scrombroid poisoning, Ciguatera poisoning, Biogenesis, Symptomology.

There is very little data on the chemistry, biology, and pharmacology of fish poisoning in the eastern Caribbean. Fish poisoning is reported from all islands of the northern Virgin and Leeward Island groups. Puerto Rico, Hispaniola and St. Croix have a much lower incidence rate than the Windward Islands (Trinidad to Martinique). The problem can be broken down into three major groupings. The endotoxins from the puffer-like fishes with the additional rarely reported cases of clupeoid, elasmobranch and hallucinogenic fish poisoning in the first group. The second major group of poisonings in the area is the result of bacterial decomposition of fresh fish. The third general type is described as ciguatera fish poisoning. Evidence from the Pacific suggests that there are at least three (probably more) distinct toxins capable of producing the ciguatera syndrome. Scombroid and ciguatera poisoning are considered to be most detrimental to the fishing industry. Because scombroid poisoning can be prevented by modern fish preservation techniques and treatment is specific and effective, it is considered a less severe problem than ciguatera poisoning. Development of commercial fisheries in the eastern Caribbean is severely impeded by the prevalence of ciguatoxin in commercially desirable species. (Jones-Wisconsin)
W74-12772

MORTALITY FROM CANCER AND CARDIOVASCULAR DISEASES IN THE COUNTY BOROUGHS OF ENGLAND AND WALES CLASSIFIED ACCORDING TO THE SOURCES AND HARDNESS OF THEIR WATER SUPPLIES, 1958-1967,
Stocks (Percy) Colwyn Bay (Wales).
P. Stocks.
J Hyg. Vol 71, No 2, p 237-252. 1973.

Descriptors: *Water quality, *Human diseases, Artesian wells, Wells, Water wells, Rivers, Hardness(Water), Mortality.
Identifiers: *Cancer, England, *United Kingdom(Wales), Stomach, Esophagus, Prostate, Bladder(Male), Breast(Female), Hypertension, Rheumatic heart disease.

Relative rates of proportionate mortality from cancer of 6 sites based on total cancer deaths and the proportions expected in all towns and from 4 types of cardiovascular disease based on total deaths from all causes, were related in the 80 county boroughs of England and Wales to the sources of water supply and to the average hardness of water in the towns. The sources of water, from upland surfaces, artesian wells and rivers, were classified in 8 groups and significant associations were found for cancers of the stomach, esophagus, prostate, male bladder and female breast and for hypertensive and chronic rheumatic heart disease. No associations were apparent with intestinal cancer, vascular disease of the nervous system or arteriosclerotic heart disease. Hardness or softness of the water was classified in 7 groups and significant associations were found for the same diseases as for source of water, none being evident for coronary disease.--Copyright 1974, Biological Abstracts, Inc.
W74-12818

BUILD-UP OF MINERAL CONTENT IN LAKE DARDANELLE AND THE EFFECT OF ZOOPLANKTON,
Arkansas Polytechnic Univ., Russellville. Dept. of Biological Science.
T. N. Palco.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 283, $7.00 in paper copy, $2.25 in microfiche. Arkansas Water Resources Research Center, Fayetteville, Publication No 24, 1974. 186 p, 57 fig, 48 tab, 38 ref. OWRT A-015-ARK(1).

Descriptors: *Arkansas, Nutrients, Water pollution effects, Poultry, Effluents, *Zooplankton, Rotifers, Nitrates, Phosphates, Chlorides, Oxygen, Temperature, Carbon dioxide, *Eutrophication, Productivity, Streams, Hydrogen ion concentration, Water chemistry, Reservoirs, Waste disposal, Water spreading, Mineralogy.
Identifiers: *Poultry effluents, *Lake Dardanelle(Ark), Uric acid, Land spreading.

The effects of poultry effluents on water quality of Lake Dardanelle and its feeder streams in West Central Arkansas were studied during three sampling periods in 1970, 1971, and 1972. To determine these effects the following factors were investigated: (1) physicochemical analysis; (2) zooplankton community identification; and (3) limited phytoplankton studies by the qualitative-quantitative assessment of chlorophylls. Feeder streams of the Lake Dardanelle Reservoir are major contributors of soluble nutrients which are available to primary producers. Their heavy load of poultry effluents is the result of large poultry operations consisting of both chicken houses and turkey ranges which are located in the watershed of these streams. The addition and the retention of these nutrients in the lake are greatly affected by the magnitude of the flow of feeder streams into the lake. The most influential stream is the Illinois Bayou, owing to its size and consistency of flow. Land spreading is the method of disposal of litter from poultry houses. The magnitude of these soluble nutrients in the streams is dependent on several factors. These include (1) soil conditions at the time of spreading of litter; and (2) the period of time for integration into the soil after spreading before the occurrence of the next rainfall in the area which has the capacity of carrying or leaching this material into the stream bed.
W74-12859

ANALYSIS OF NUTRIENT SUPPLIES FOR ALGAE IN ELEPHANT BUTTE RESERVOIR,
New Mexico Univ., Albuquerque. Dept. of Biology.
G. V. Johnson, D. E. Kidd, and J. D. Garcia.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 282, $4.25 in paper copy, $2.25 in microfiche. New Mexico Water Resources Research Institute, Las Cruces, Report No 037, April 1974. 73 p, 10 fig, 10 tab, 14 ref. OWRT A-040-NMEX(3).

Descriptors: *Aquatic algae, *Nutrient requirements, *Chlorophyta, *New Mexico, Reservoirs, Eutrophication, Biomass, *Nitrates, *Phosphates, Orthophosphates, *Chlamydomonas, Enzymes, Rio Grande River, Bioassay, Primary productivity, Phytoplankton.
Identifiers: *Elephant Butte Reservoir(N Mex), Artificial substrates, Scenedesmus dimorphus, Anabaena flos-aquae, Chlamydomonas debaryana var cristata, *Platymones sp.

Nutrient supplies for algae in Elephant Butte Reservoir were investigated by chemical analysis of water samples, laboratory bioassays with unialgal cultures, and field experiments in which the effect of nutrient additions on primary productivity of the natural phytoplankton population was determined. The average nitrate concentration was 0.59 mg/liter as nitrogen. The average total phosphate and orthophosphate concentrations were 0.395 and 0.090 mg/liter as phosphorus in the lower Reservoir and 0.642 and 0.176 mg/liter as phosphorus in the upper Reservoir. Nitrogen was a limiting nutrient for algal growth in all laboratory bioassays of Reservoir water conducted with green algae. Phosphorus was also limiting in most bioas-

says of Reservoir water conducted in the laboratory. Growth of algae colonizing artificial substrates suspended in the Reservoir was correlated with the nitrate concentration of Reservoir water. The nitrogen content of the algal material varied and was not correlated with the nitrate concentration of Reservoir water. These observations suggest that nitrogen was limiting accumulation of algal biomass on the artificial substrates. Cultures of two predominate species of green algae occurring in the Reservoir, Chlamydomonas sp. and Platymonas sp., were found to produce acid and alkaline phosphatases when grown with growth limiting orthophosphate concentrations. Growth of algae in nutrient solutions with varying nitrate concentrations in the laboratory indicated that the nitrate levels in Reservoir water would severely limit growth if other nutrients were present at the levels supplied in the bioassays. (Hain-New Mexico State)
W74-12861

COMPONENT DESCRIPTION OF SEDIMENT-WATER MICROCOSMS,
Utah State Univ., Logan. Center for Water Resources Research.
J. Hill, IV, and D. B. Porcella.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 293, $3.75 in paper copy, $2.25 in microfiche. Utah Water Research Laboratory, Publication PRWG121-2, Utah State University, Logan, June 1974. 45 p, 15 fig, 16 tab, 12 ref. OWRT B-081-UTAH(1). 14-31-0001-3942.

Descriptors: *Computer models, Microenvironment, Nutrients, Sediments, Dissolved oxygen, Flow, Eutrophication, Systems analysis, *Model studies, *Sediment water interfaces, Ecosystems, Mercury, Aerobic conditions, Anaerobic conditions.
Identifiers: *Component analysis.

The development and application of complementary variables (potential and flux) for modeling environmental systems are illustrated for the hydraulic and dissolved oxygen subsystems of laboratory microcosms. These sediment-water, semi-continuous flow microcosms were used to determine nutrient interchange and mercury interactions under lighted (aerobic) and dark (anaerobic) conditions. The approach of using complementary variables to describe such systems forces a more complete conceptual understanding of the system and better attention to those parameters (many of which are unknown) requiring measurement. Complementary variables are incorporated into basic linear component equations which describe basic processes of energy transfer and transformation. The components are interconnected through the use of bond graphs and reduced through topographic and matrix techniques to state space system equations. A transfer function is determined from the state equations and from time domain analysis of the system output. These two expressions of the transfer functions are used to determine component values. Observed and predicted hydraulic flow and dissolved oxygen values agreed fairly closely. Reasons for deviation in predicted oxygen levels are discussed. Estimates of capacitance (stored potential energy) inertance (stored kinetic energy), and resistance were obtained from data analysis for each particular subreaction where judged important in the conceptualization of the particular system of interest.
W74-12868

DEER AND RABBIT RESPONSE TO THE SPRAY IRRIGATION OF CHLORINATED SEWAGE EFFLUENT ON WILD LAND,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W74-12887

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED BYRON STATION UNITS 1 AND 2, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va. 22161, as Docket No. 50454-47; $8.75/copy, $2.25/microfiche. Docket Nos STN-50-454 and STN-50-455, July 1974. 297 p, 34 fig, 51 tab, 174 ref.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Illinois.
Identifiers: *Pressurized water reactors, *Rock River(Ill), *Environmental Impact Statements.

The site for the proposed Byron Station, Units 1 and 2 is near Rock River in Rockvale Township, Ogle County, Illinois. The station will employ two pressurized water reactors cooled by closed-cycle cooling using two natural-draft cooling towers. Makeup water will be drawn from and discharged to the Rock River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue construction permits subject to the following: (1) Avoid any unnecessary adverse environmental impacts during constructions; (2) monitoring as specified; (3) review construction activities periodically for conformity; (4) provide written notification of any significant adverse impacts unforeseen; (5) provide analysis and plan of action to correct adverse impacts observed during construction. (Houser-ORNL)
W74-12902

FINAL ELK RIVER REACTOR SITE SURVEY, RESULTS AND SUMMARY - JULY 23, 1974.
United Power Association, Elk River, Minn.
For primary bibliographic entry see Field 5B.
W74-12903

ECOLOGY OF TOXIC METALS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12908

PROTEIN RECOVERED FROM INDUSTRIAL WASTE WATER AS FEED FOR CHICKS,
Norges Landbrukshoegskole, Vollebekk. Dept. of Poultry and Fur Animal Science.
For primary bibliographic entry see Field 5B.
W74-12933

THE EFFECT OF SELECTED DYES IN THE ENVIRONMENT,
Crompton and Knowles Corp., Reading, Pa. Dyes and Chemicals Div.
R. H. Horning.
Tappi, Vol 57, No 3, p 135-137, March 1974. 1 fig, 6 tab, 3 ref.

Descriptors: *Dyes, *Dye concentrations, *Dye releases, *Water pollution effects, *Fish, *Toxicity, Effluents, Organic compounds, Color, Oxygen consumption, Water pollution sources, Industrial wastes, Chemical wastes, Anaerobic conditions, Minnows.
Identifiers: Fathead minnows.

Several studies concerning the polluting effects of dyes in paper and textile mill discharges are summarized. One investigation, which provided the average metal contents of 900 acid, basic, and direct dyes, indicated that the contribution of non-metallic dyestuffs to the metal content of typical effluents is of the order of parts per billion. Another study led to an improved method for measuring effluent color values independent of their hue. The remaining examinations covered 29 acid, basic, and direct dyes representative of nearly all important dye classes. In their effects on fathead minnows, 11 dyes showed 96-hour TL-50 concentrations below 100 mg/liter, while Warburg respirometer tests indicated oxygen uptakes for 9 dyes that were at least 10% less than for high-concentration controls. Several dyes tested at 1-5 mg/liter of organic carbon provided results within 5% of the control. Only 3 dyes showed a significant effect on being added to an anaerobic system, with digester failure occurring only in one case. It is concluded that dyes used with proper care are not likely to pose serious ecological hazards. (Witt-IPC)
W74-12950

THE DISPOSAL OF WASTE IN THE OCEAN,
Southern California Coastal Water Research Project, Los Angeles.
For primary bibliographic entry see Field 5E.
W74-12956

PRODUCTION AND RELEASE OF RADIOACTIVE KRYPTON- AND XENON-ISOTOPES BY NUCLEAR POWER PLANTS AND REPROCESSING PLANTS AND THE EXPECTED RADIOLOGICAL BURDEN TILL THE YEAR 2000, (ERZEUGUNG UND FREISETZUNG VON RADIOAKTIVEN KRYPTON- UND XENON-ISOTOPEN DURCH KERNREAKTOREN UND WIEDERAUFARBEITUNG SANLAGEN UND DIE VORAUSSICHTLICHE RADIOLOGISCHE BELASTUNG BIS ZUM JAHR 2000),
Kernfurschungszantrum, Karlsruhe (West Germany).
For primary bibliographic entry see Field 5A.
W74-12971

LEAD IN THE CALIFORNIA SEA LION (ZALOPHUS CALIFORNIANUS),
Ohio State Univ., Columbus. Environmental Biology Program.
H. W. Braham.
Environ Pollut Vol 5, No 4 p 253-258, 1973.

Descriptors: *Lead, *Pollutant identification, *Water pollution effects, Heavy metals, Metals, Spectrophotometry, Analytical techniques, Bioassay.
Identifiers: California, *Sea lions, Zalophus-Californianus, Seals(Animal).

Atomic absorption spectrophotometric analysis was conducted on tissue samples taken from 19 organs in the California sea lion, Z. californianus, to determine the distribution and concentration of the heavy metal Pb. Pb was accumulated in significantly higher concentrations in hard tissue, bone and teeth, than in soft tissue such as fat and muscle. These results are comparable with those found in man, suggesting that exposure levels of Pb may be similar for terrestrial and coastal environmental communities.--Copyright 1974, Biological Abstracts, Inc.
W74-12973

ACUTE AND CHRONIC TOXICITY, UPTAKE AND RETENTION OF CADMIUM IN FRESHWATER ORGANISMS,
Freshwater Fisheries Research Lab., Tokyo (Japan).
H. Kumada, S. Kimura, M. Yokote, and Y. Matida.

Bull Freshwater Fish Res Lab Tokyo. Vol 22, No 2, p 157-165. 1972.

Descriptors: *Aquatic life, Aquatic animals, *Freshwater fish, *Cadmium, *Water pollution, Water, *Toxicity, Pollutants, Fish, Trout, Rainbow trout, Growth, Reproduction, Lethal limit.
Identifiers: Dace, Triborodon-hakonensis, Japan.

The ratio of 96 or 240 h TLm (medium tolerance limit) of Cd to a concentration which cuases little or no inhibition of fish (rainbow, trout, dace, Triborodon hakonensis) growth in 30 wk was less than 10. Long term exposure of fish and aquatic organisms to Cd increases the element content. The accumulation rate of Cd was apparently different by species. The present permissible concentration of Cd in potable water can not be considered safe enough to propagate rainbow trout normally. Further studies should be made in the relationship between the chemical forms of Cd compounds accumulated in fish and their toxicity, to establish the safety levels for man of Cd contents in aquatic organisms and water.--Copyright 1974, Biological Abstracts, Inc.
W74-13027

STUDIES ON THE CRUSTACEAN PLANKTON OF A FRESHWATER TANK AT PILANI, RAJASTHAN, (IN MALAYALAM)
Christ Coll., Irinjalakuda, (India).
C. K. G. Nayar.
J Kerala Acad Biol. Vol 3, No 2, p 12-19, 1972. Illus. English summary.

Descriptors: Crustaceans, *Copepods, Aquatic animals, Plankton, *Zooplankton, Storage tanks, Water pollution, Water temperature, Animal growth, *Environmental effects, *Reproduction, Analysis.
Identifiers: *Cladocers, *India.

Fortnightly collections of plankton were taken for a period of 20 mo. from a concrete tank at Pilani, Rajasthan, India. Collections were made with the help of a specially prepared tow net; quantitative estimations were made after Green and Nayer. Physico-chemical factors such as temperature, pH, dissolved O2, alkalinities due to carbonate and bicarbonate were also determined at the time of each collection. No well defined seasonal periodicity was shown for the total zooplankton in the Pilani tank. Among the zooplankton, the Crustacea contributed more than 65% except during January-February 1963, and January-March 1964. Crustacean percentage was higher during summer months when the water is relatively warm. The Copepoda and Cladocer show a somewhat similar pattern of seasonal distribution. As with the Cladocera, increase in water temperature may be an important factor in inducing the growth and reproduction of the Copepoda.--Copyright 1974, Biological Abstracts, Inc.
W74-13031

SHELLFISH CULTURE USING THE HEATED EFFLUENT FROM ELECTRIC POWER PLANTS,
Connecticut Univ., Storrs. Inst. of Water Resources.
S. Y. Feng, and G. S. Campbell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 409 $3.25 in paper copy, $2.25 in microfiche. Completion Report, 1974. 5 p, 4 ref. OWRT A-040-CONN(1), 14-31-0001-3807.

Descriptors: *Shellfish farming, *Aquiculture, *Oysters, *Thermal power plants, Effluents, *Heated water, *Growth rates, Water pollution effects, Temperature, Proteins, Carbohydrates.
Identifiers: Prolonged exposure, Condition index, Shell disposition, Gonadal development.

Yearling oysters (Grassostrea virginica) suspended in trays in the heated effluent and also near the intake to a power plant (controls) were sampled monthly for 17 months and their protein and carbohydrate content, condition index and extent of gonadal development determined. The oysters in the heated effluent consistently showed higher levels of portein (56%), carbohydrate (109%) and condition index (22%) than the control oysters during the winter and spring months. The rapid growth of oysters in the discharge canal during this period appeared to be associated with optimum temperatures (14-19 C) and the presence of a very large spring phytoplankton bloom, which due to the low ambient temperatures (2-7 C) in the intake canal, was not available to the control oysters for use. During the summer months, the control oysters attained levels of protein, carbohydrate and condition index that were similar to those of the warm-water grown oysters. The development of the gonads of the oysters in the heated effluent occurred four months earlier than in the controls, but spawning took place only one month earlier. The warm-water grown oysters produced thicker shells that the control oysters. (deLara-Connecticut)
W74-13045

CONTAMINATION OF CHANNEL CATFISH WITH DIELDRIN FROM AGRICULTURAL RUNOFF,
Iowa Cooperative Fisheries Research Unit, Ames.
R. V. Bulkley, L. R. Shannon, and R. L. Kellogg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 416 $5.75 in paper copy, $2.25 in microfiche. Completion Report, Iowa Water Resources Research Institute, Ames, No 62, (ISWRRI-62), June 30, 1974. 144 p, 29 fig, 43 tab, 105 ref, append. OWRT A-042-IA(1), 14-31-0001-3515/3815/4015.

Descriptors: *Dieldrin, *Channel catfish, Water pollution, Agricultural pesticides, Path of pollutants, Pesticides, Absorption, Chlorinated hydrocarbon pesticides, Runoff, *Iowa, Corn(Field).
Identifiers: Dieldrin accumulation, Retention, Excretion, *Des Moines River(Ia).

Dieldrin concentrations in Des Moines River water measured from April to October ranged from 1 to 50 ng/liter during 1971-1973. Peak concentrations in river water usually followed within a month after corn planting season. Dieldrin levels in aquatic insects and minnows sampled in 1973 were highest in June, decreased in the summer and increased to higher levels in autumn. Dieldrin levels in catfish muscle varied significantly with size and age of fish but not with amount of muscle fat. Annual and seasonal trends in dieldrin levels in catfish muscle were not consistent for different length groups except that peak levels most frequently occurred in July each year. Biomagnification of dieldrin from catfish food organisms to catfish muscle was not evident. Twenty-eight day exposure to 75 ng/liter dieldrin in water resulted in 14-16 in. catfish accumulating more dieldrin in muscle than did 6-9 in. fish. After elimination for 28 days, dieldrin levels in both size groups were nearly equal. When fish were exposed in both food and water, dieldrin from both sources contributed to the total muscle concentration. Large catfish accumulated more dieldrin from food and water than did small catfish but eliminated dieldrin at a similar rate after exposure ceased.
W74-13050

EFFECTS OF OFFAL DISPOSAL FROM ANIMAL PROCESSING PLANTS ON WATER QUALITY AND AQUATIC LIFE OF NATURAL STREAMS,
Mississippi State Univ., State College. Dept. of Wildlife and Fisheries.
D. E. Wesley, D. Williams, and B. M. Teels.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-236 420, $3.75 paper copy, $2.25 in microfiche. Mississippi Water Resource Research Institute, Mississippi State, Completion Report, July 1974. 40 p, 3 fig, 13 tab, 16 ref, append. OWRT A-077-MISS(1).

Descriptors: *Organic wastes, Water pollution, Aquatic life, *Mississippi, Water quality, Water pollution effects, Path of pollutants, *Waste disposal, Dissolved oxygen.
Identifiers: *Offal disposal, Stream recovery, *Animal processing wastes.

Two streams in Mississippi that receive offal from animal processing plants were chosen to monitor the effects of such animal wastes on the stream's water quality, fauna and flora. Sampling stations were established systematically to evaluate the recovery zone for these streams, if biological and chemical alterations occurred. Significant increases in carbon dioxide and orthophosphate levels occurred below the outflows in both receiving streams. Dissolved oxygen was significantly decreased in small, secondary flowage that carried the offal from the outflow pipe to the study stream on one of the study areas. No significant reduction could be detected in dissolved oxygen content in either of the primary streams studied. Other than orthophosphates, which were still detectably high five miles below the outflow on one of the streams, all chemical characteristics of both streams had returned to normal at the last station or were not measurably affected by offal disposal. Certain flora and fauna populations in one of the study streams were significantly altered at the point of intromission of the offal, but, because of another potential source of contamination, these alterations could not be directly associated with offal disposal.
W74-13053

CADMIUM CONTENT AND DISTRIBUTION IN THE MUD, BLOOD CLAMS, FISH FLESH AND THE ALGA, PORPHYRA TENERA, IN THE ARIAKE BAY (IN JAPANESE),
Kyushu Univ., Fukuoka (Japan). Dept. of Fisheries Chemistry.
For primary bibliographic entry see Field 5B.
W74-13073

AVOIDANCE BEHAVIOR OF INSECTICIDE SUSCEPTIBLE AND RESISTANT POPULATIONS OF MOSQUITOFISH TO FOUR INSECTICIDES,
Arizona Cooperative Fishery Unit, Tucson.
B. Kynard.
Transactions of the American Fisheries Society, Vol 103, No 3, p 557-561, July 1974. 1 fig, 2 tab, 14 ref.

Descriptors: *Insecticides, *Resistance, *DDT, *Endrin, Adaptation, Toxicants, Environmental effects, Laboratory tests, Methodology, Chlorinated hydrocarbon pesticides, Organophosphorous pesticides, Bioassay, Behavior, Fish behavior, Pesticides.
Identifiers: *Mosquitofish, *Gambusia affinis, Insecticide tolerance, Avoidance, *Parathion, *Toxaphene, Y-maze.

Mosquitofish, Gambusia affinis, from two populations differing greatly in insecticide tolerance were tested for their ability to avoid concentrations of DDT, endrin, toxaphene and parathion in a Y maze. Both groups avoided endrin, toxaphene and parathion. DDT was avoided by susceptible fish but not by resistant fish. Resistant fish avoided damaging concentrations (except DDT) better than did susceptible fish. (Katz)
W74-13074

DISTRIBUTION AND CONDITION OF FISHES IN A SMALL RESERVOIR RECEIVING HEATED WATERS,
North Texas State Univ., Denton. Dept. of Biological Sciences.
D. L. McNeely, and W. D. Pearson.

Transactions of the American Fisheries Society, Vol 103, No 3, p 518-530, July 1974. 6 fig, 4 tab, 30 ref.

Descriptors: *Heated water, *Distribution patterns, *Thermal stratification, *Reservoirs, *Temperature, *Channel catfish, Minnows, Aquatic habitats, Cooling water, Stratification, Effluents, Sunfishes, Catfishes, Industrial wastes, Seasonal, Environmental effects, Water chemistry, *Thermal pollution, Water pollution effects.
Identifiers: Condition coefficient, Crappie, Menidia audens, Notropis emilae, Cyprinus carpio, Shad.

The effects of thermal effluent on the distribution and condition of fishes were determined in a 330-ha reservoir in northeastern Texas. Fish were collected at five stations every 2 weeks between May 1971 and June 1972. Water temperatures at the mouth of the effluent canal were highest (42.2C) in July and were 3-8C higher at this location than in other areas of the reservoir. Mississippi silversides (Menidia audens) and pugnose minnows (Notropis emilae) forage species were never found near the mouth of the effluent canal. White crappie (Pomoxis annulans) and river carpsucker (Cyprinus carpio) may have been attracted to the effluent area in spring and summer. Several species were found distributed evenly throughout the reservoir. The size and condition of fishes collected at the mouth of the effluent canal were not significantly different from those of fish collected at other stations in the reservoir although the condition coefficients of channel catfish, river carpsucker, gizzard shad, threadfin shad, and bluegill were lower than those reported in other locations. Results suggest that the effects of heated effluents in small reservoirs may be generalized over the entire body of water, particularly when a cool-water refuge area is present beneath the heated surface stratum. (Katz)
W74-13076

RESPIRATORY RESPONSES TO HYPOXIC CONDITIONS IN CRUCIAN CARP LIVING IN DIFFERENT HABITATS, (IN JAPANESE),
Shiga Univ., Otsu (Japan). Faculty of Education.
N. Suzuki, and K. Kanzaki.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 40, No 1, p 57-62, January 1974. 3 fig, 21 ref. (English summary).

Descriptors: *Dissolved oxygen, *Respiration, *Carp, Laboratory tests, Habitats, Adaption, Speciation, Water pollution effects.
Identifiers: *Hypoxia conditions, *Opercular rates, Carassius auratus cuvieri, Carassius auratus gobelio, Gengorobuna, Hiwara, Goldfish.

Adult carp (Carassius auratus cuvieri) inhabit the upper of middle layer of offshore waters where hypoxic conditions rarely occur. Carassius auratus gibelio are found in lagoons and bay bottoms where hypoxia is a common condition. Oxygen consumption and opercular rate were measured in the laboratory in crucian carp living in different habitats, with various oxygen concentrations. Marked differences in critical concentration of oxygen consumption were not detected between the two varieties. In Carassius auratus cuvieri, a decrease in dissolved oxygen concentration first evoked an increase in opercular movement at a dissolved oxygen concentration of 3 ml/l; maximum opercular movement occurred at a lower oxygen concentration (2 ml/l); and disruption of the opercular rhythm was not detected within the range of oxygen concentrations employed in the experiments. These results show that opercular movements of Carassius auratus cuvieri must be more sensitive to lower oxygen tension and thus Carassius auratus cuvieri is less adaptive to hypoxic conditions than Carassius auratus gibelio. (Katz)
W74-13077

EFFECTS OF ANTIBODIES ON SURVIVAL OF CARANGID FISH LARVAE (CARANX MATE), REARED IN THE LABORATORY,
Hawaii Inst. of Marine Biology, Kaneohe.
J. W. Struhsaker, D. Y. Hashimoto, S. M. Girard, F. T. Prior, and T. D. Cooney.
Aquaculture, Vol 2, No 1, p 53-88, May 1973. 11 fig, 8 tab, 30 ref.

Descriptors: *Antibiotics(Pesticides), *Larvae, *Chlorella, Laboratory animals, Marine fish, Bactericides, Bacteria, Immature growth stage, Sea water, Hatching, Commercial fish, Aquaculture, Methodology, Aeration, Phytoplankton, Algae, Growth rate, Pseudomonas, Water pollution effects.
Identifiers: *Erythromycin, *Caranx mate, *Rearing technique, Penicillins, Polymyxins, Survival, Carangid.

Techniques are described which have proven successful in rearing the larvae of nine species of marine fishes in Hawaii. The results of intensive experiments on larvae of the carangid fish, Caranx mate, are presented, with emphasis on the effects of various antibiotics on bacterial populations in rearing containers and on larval survival. Suitable foods for the Caranx mate larvae are discussed and bacteria found in rearing containers and from natural water samples are identified. Of a number of antibiotics tested, the most effective in decreasing bacteria in sea water and enhancing hatching success and larval survival were the polymyxins, penicillins, and especially erythromycin. (Katz)
W74-13079

TOXICITY OF CHLORINE AND HEAT TO PINK (ONCORHYNCHUS GORBUSCHA) AND CHINOOK SALMON (O. TSHAWYTSCHA),
Washington Univ., Seattle. Fisheries Research Inst.
Q. J. Stober, and C. H. Hanson.
Transactions of the American Fisheries Society, Vol 103, No 3, p 569-576, July 1974. 6 fig, 14 ref.

Descriptors: *Toxicity, *Chlorine, *Chinook salmon, *Pink salmon, *Salmon, *Temperature, Fish behavior, Sea water, Bioassay, Mortality, Juvenile fish, Laboratory tests, Equilibrium, Salmonids, Chemical degradation, Methodology, Spectrophotometry, Analytical techniques, Water pollution effects, Environmental effects, Pesticide residues.
Identifiers: Oncorhynchus gorbuscha, Oncorhynchus tsawytscha, LD50, LT50, Sublethal limits.

The toxicity of chlorine to juvenile chinook salmon was tested at five residual concentrations ranging from 0.05 to 1.0 mg/liter and at four temperatures (delta t 0, 2.6, 4.6 and 10C) in a matrix design. Juvenile pink salmon were tested at three temperatures (delta t 0, 5.0, and 9.9C). Each matrix was stressed at four exposure periods (7.5, 15, 30, and 60 mon.). The LC50 and LT50 values are presented for each of the conditions tested. A decrease in the tolerance of both species to residual chlorine was demonstrated with increasing temperature and exposure time. The 60-minute exposure period and the 9.9 and 10C delta t were the most acutely toxic to each species. The equilibrium loss response for chinook salmon exposed to heat and chlorine preceded the LT50 by at least 55%. The LC50 was 0.045 mg/liter for both species after exposure to fluctuating chlorine concentrations during 2-hr periods. The LT50 occurred in about 100 minutes at approximately 0.5 mg/liter residual chlorine. Factors contributing to the dynamics of chlorine decay in sea water are discussed. The effect of light reduced the required time to decay (1.0--0.01 mg/liter) by a factor of about 7. The need for fish behavioral studies is suggested as a logical extension of this investigation. (Katz)
W74-13080

RHODE ISLAND SOUND DREDGE SPOIL DISPOSAL AND TRENDS IN THE FLOATING TRAP FISHERY,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
M. P. Sissenwine, and S. B. Saila.
Transactions of the American Fisheries Society, Vol 103, No 3, p 498-506, July 1974. 11 fig, 3 tab, 13 ref.

Descriptors: *Dredging, *Waste disposal, *Rhode Island, Commercial fishing, Turbidity, Commercial fish, Trapping, Striped bass, Regression analysis, Water pollution effects.
Identifiers: *Dredge spoil, *Floating traps, *Scup, Dumping, Stenotomus chrysops, Bluefish, Cod, Mackerel, Menhaden.

Data was evaluated to assess the impact of the Rhode Island Sound dredge spoil disposal area on the floating trap fishery. It is unlikely that a significant portion of the observed decline in landings has resulted from a decrease in fishing effort since no correlation was established between these variables. The mean levels of landings were not significantly different when comparisons were made between the period before the onset of dumping and the short post-dumping period. A review of other fisheries for scup (Stenotomus chrysops), the predominant species caught by Rhode Island floating traps, indicated that landings have declined throughout the species' range. (Katz)
W74-13081

EFFECTS OF AROCLOR 1254 ON LABORATORY-REARED EMBRYOS AND FRY OF SHEEPSHEAD MINNOWS (CYPRINODON VARIEGATUS),
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
S. C. Schimmel, D. J. Hansen, and J. Forester.
Transactions of the American Fisheries Society, Vol 103, No 3, p 582-586, July 1974. 2 fig, 4 tab, 11 ref.

Descriptors: *Minnows, *Fish hatcheries, *Aroclor, *Clorinated hydrocarbon pesticides, Immature growth stage, Juvenile fish, Fry, Temperature, Salinity, Bioassay, Methodology, Resistance, Toxicity, Mortality, Food chains, Laboratory tests, Hatching, Pesticides, Sea water, Statistical models, Water pollution effects.
Identifiers: *Cyprinodon variegatus, *Sheepshead minnow.

Eggs of the sheepshead minnow were artificially fertilized and maintained at temperatures from 15 to 35C and in salinities from 0 to 35 parts per thousand to determine efficient culture conditions. Fertilization was not affected by temperature or salinity ranges chosen, but hatching success was greatest at a temperature range of 24 to 35C and a salinity range of 15 to 30 parts per thousand. Artificially fertilized sheepshead minnow eggs were exposed to logarithmic concentrations of Aroclor 1254 (10.0 to 0.1 microgram/liter) in seawater averaging 30C and 24 parts per thousand in a flow-through bioassay. Fertilization was not affected but significantly fewer embryos developed in the 10.0 microgram/liter concentration, and fewer fry survived in concentrations greater than 0.1 microgram/liter. Fry were more susceptible to Aroclor 1254 than were embryos, juveniles, or adults. (Katz)
W74-13082

PCB CONTENTS IN MARINE ANIMALS IN TOKYO BAY, (IN JAPANESE),
Tokai Regional Fisheries Research Lab., Tokyo (Japan).
H. Shimma, S. Arima, and K. Nagakura.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 39, No 11, p 1151-1162, November 1973. 4 fig, 4 tab, 7 ref. (English summary).

Descriptors: *Polychlorinated biphenyls, *Aroclors, *Marine animals, *Chlorinated hydrocarbon pesticides, Clams, Chemical analysis, Lipids, Food chains, Sharks, Shrimp, Methodology, Gas chromatography, Analytical techniques, Path of pollutants, Water pollution effects.
Identifiers: *Tissue analysis, *Japan(Tokyo Bay), Extraction methods, Bioconcentration, Sea squirt, Puffer, Starfish.

The PCB contents of 30 species of marine animals in Tokyo Bay were determined. Four species of fish caught around Hateruma Island, Okinawa, were also analyzed for comparison with those in Tokyo Bay. Several extraction methods were tested and all but the direct-alkali-digestion method gave the same results. PCB values of fish meats from Okinawa were 0.02-0.1 ppm. The samples from Tokyo Bay had a maximum value of 2 ppm in puffer and a minimum of 0.01 ppm in bloody clam and sea squirt. All these results suggested that the accumulation of PCB might be caused by a food chain. The highest PCB value based on fat content was 603 ppm in the meat of spotted shark. The PCB values of viscera were always higher than those of meat. On a fat basis, the differences between viscera and meat values were somewhate smaller. The gas chromatographic patterns of PCB in the samples differed not only between fish species but also between the viscera and meat of the same fish. (Katz)
W74-13083

EFFECT OF POLYCHLORINATED BIPHENYL COMPOUNDS ON SURVIVAL AND REPRODUCTION OF THE FATHEAD MINNOW AND FLAGFISH,
National Water Quality Lab., Duluth, Minn.
A. V. Nebeker, F. A. Puglisi, and D. L. DeFoe.
Transactions of the American Fisheries Society, Vol 103, No 3, p 562-568, July 1974. 1 fig, 9 tab, 12 ref.

Descriptors: *Aroclors, *Clorinated hydrocarbon pesticides, *Polychlorinated biphenyls, Pesticides, Bioassay, Lethal limit, Toxicity, Toxicants, Minnows, Absorption, Reproduction, Resistance, Growth rates, Laboratory tests, Methodology, Enzymes, Hatching, Analytical techniques, Gas chromatography, Immature growth stage.
Identifiers: *Pimephales promelas, *Jordanella floridae, *LC50, *Flagfish, Bioconcentration, Continuous-flow bioassay.

Two 9-month continuous-flow bioassays and several intermediate length continuous-flow tests were conducted to determine safe levels of Aroclor 1242, 1248 and 1254 for the fathead minnow (Pimephales promelas) and Arochlor 1248 for the flagship (Jordanella floridae). Calculated 96-hr LC50 values for newly hatched fathead minnows were 7.7 microgram/liter for Aroclor 1254 and 15 microgram/liter for 1242. Three-month-old fatheads had a 96-hr LC50 of 300 microgram/liter for 1242. Reproduction occurred at and below 1.8 microgram/liter 1254 and at and below 5.4 microgram/liter 1242. Newly hatched young were the most sensitive life stage. Growth of young fatheads and flagfish was also affected above 2.2 microgram/liter 1248, and none survived above 5.1 microgram/liter after 30 days. Tissue residues in fathead minnows ranged from 0.7 microgram/g 1248 in control fish to 1036 microgram/g 1254 in fish held for 8 months in water containing 4.6 microgram/liter 1254. (Katz)
W74-13085

DISTRIBUTION OF BOTTOM FISHES IN RELATION TO OXYGEN CONTENTS IN THE BOTTOM WATER OR OMURA BAY, (IN JAPANESE),
Nagasaki Prefecture Fisheries Experiment Station (Japan).
I. Mori, T. Tokunaga, M. Kuwaoka, and T. Fugiki.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 39, No 7, p 753-758, July 1973. (English summary).

Descriptors: *Dissolved oxygen, *Distribution, Commercial fishing, Benthos, Benthic fauna, *Water pollution effects, Oxygen, *Oxygen demand, Shrimp, Fish, *Bays.
Identifiers: *Japan(Omura Bay).

Dissolved oxygen concentrations were determined for the bottom layer of Omura Bay. Fish and other marine organisms were collected by trawling and the effect of oxygen distributions on the distributions of bottom living organisms was investigated. An oxygen content lower than 1 ml/l appeared to be an extremely unfavorable environment. Bottom living organisms, for the most part, last activity and died. Thos that could avoid the low oxygen environment moved towards better conditions and formed fishing areas. (Katz)
W74-13086

TOXICITY OF SYNTHETIC DETERGENTS TO FISH AND AQUATIC INVERTEBRATES,
Aston Univ., in Birmingham (England). Dept. of Biological Sciences.
P. D. Abel.
Journal of Fish Biology, Vol 6, No 3, p 279-298, May 1974. 1 fig, 1 tab, 71 ref.

Descriptors: *Detergents, *Toxicity, *Aquatic animals, *Alkylbenzene sulfonates, Hardness(Water), Temperature, Dissolved oxygen, Water quality, Fishkill, Methodology, Mortality, Bioassay, Growth rate, Fish behavior, Inhibition, Biochemistry, Fish physiology, Environmental effects, Membranes, Publications, Invertebrates, Fish, Testing, Water pollution effects.
Identifiers: *Gills, *Sublethal effects, Literature survey, LC50, Mode of Action, Tolerance.

Synthetic detergents are reported to be acutely toxic to fish in concentrations between 0.4 and 40 mg/l. Factors affecting toxicity include the molecular structure of the detergent, water hardness, temperature and dissolved oxygen concentration; the age and species of the test fish, and acclimation to low concentrations of detergent. Some of these factors appear to be of only limited importance. Gill damage is the most obvious acute toxic affect; the immediate cause of death may be asphyxiation, but detergents may also be toxic internally. Sublethal effects include retardation of growth, alteration of feeding behavior and inhibition of chemoreceptor organs. Low levels of detergents may also increase the uptake of other pollutants. Invertebrates, especially in their juvenile stages, are extremely sensitive to detergents: concentrations below 0.1 mg/l interfere with growth and development in some species. The interactions between detergents and proteins, and their influence on membrane permeability may be the basis of biological action of detergents. Detergents in natural waters are usually partially degraded, and a maximum permissile concentration of 0.5 mf/l would probably be harmless under most conditions. (Katz)
W74-13087

THE EFFECT OF ALGAE ON THE WATER CONDITIONS IN FISH REARING TANKS IN RELATION TO THE GROWTH OF JUVENILE SOLE, SOLEA SOLEA (L.),
Ministry of Agriculture, Fisheries and Food, Port Erin (England). Fisheries Lab.
R. Alderson, and B. R. Howell.
Aquaculture, Vol 2, No 1, p 281-288, May 1973. 3 fig, 1 tab, 8 ref.

Descriptors: *Fish toxins, *Ammonia, *Growth rate, Laboratory tests, Fish physiology, Algae, Fish management, Metabolism, Methodology, Bioassay, Nitrogen compounds, Hydrogen ion concentration, Water pollution effects.
Identifiers: *Dunaliella tertiolecta, *Sole, *Solea solea.

In an experiment in which fish were held in stat water, ammonia accumulated only in those tan which did not contain a population of the unicell lar alga Dunaliella tertiolecta. The poorer grow of the fish held in the tanks without algae is su gested as being related to this result. (Katz)
W74-13088

SOME HEAVY METALS IN SPRAT (SPRATTU SPRATTUS) AND HERRING (CLUPE HARENGUS) FROM THE INNER OSLOFJORD
Oslo Univ. (Norway). Lab. for Marine Zoolo and Marine Chemistry.
A. T. Andersen, A. Dommasnes, and I. H. Hesthagen.
Aquaculture, Vol 2, No 1, p 17-22, May 1973. 1 f 2 tab, 2 ref.

Descriptors: *Baseline studies, *Copper, *Zin *Cadmium, *Lead, *Herrings, Water qualit Water quality standards, *Heavy metals, Meta Monitoring, Domestic wastes, Commercial fis Methodology, Spectrophotometry, Bioassay, Pa of pollutants, Absorption, Water pollution effec Pollutant identification.
Identifiers: *Sprat, Clupea harengus, Spratt sprattus, *Norway(Oslofjord).

As part of a baseline study initiated in the Osl jord, Norway, concentrations of copper, zin cadmium and lead have been measured in the ag groups 0 and 1 sprat, Sprattus sprattus (L), and 0-group herring, Clupea harengus (L). Values f the concentrations of these metals in the sea-wa are also given. The results of these findings a discussed. Copper and lead content are greater young sprat and herring; zinc content is greater older fish. Cadmium content shows little variati correlated with age. (Katz)
W74-13089

EFFECTS OF WATER QUALITY, A TIBIOTICS, PHYTOPLANKTON AND FOO ON SURVIVAL AND DEVELOPMENT OF LA VAE OF SCYLLA SERRATA (CRUSTACE PORTUNIDAE),
Hawaii Inst. of Marine Biology, Kaneohe.
R. W. Brick.
Aquaculture, Vol 3, No 3, p 231-244, June 1974 fig, 4 tab, 24 ref.

Descriptors: *Crabs, *Larvae, Water qualit *Phytoplankton, *Antibiotics(Pesticides), Imm ture growth stage, Commercial shellfish, Chlor la, Methodology, Laboratory tests, Temperatu Algae, Water pollution effects.
Identifiers: *Scylla serrata, Zoeae, *Megalop Development, Penicillin-G, Polymyxin-B, Artem salina, Survival.

Larvae of the portunid crab were successfu reared using a combination of antibioti (penicillin-G + polymyxin-B), phytoplankt (Chlorella sp.) and appropriate food (Artem salina nauplii). Antibiotics enhanc premetamorphic survival of zoeae while leavi rate of development unaltered. Water filtrati and ultraviolet sterilization had no significant fect on rates of zoeal survival or development. T presence of Chlorella did not affect zoeal survi as it stimulated production of megalopae. Survi and development of zoeae varied with type a concentration food organisms with the highest l val survival resulting from feeding with Artem nauplii. A daily optimum food concentration w established for zoeal survival and for success metamorphosis of zoeae to megalopa. (Katz)
W74-13090

PROBLEMS WITH DUMPING OF RED MUD SHALLOW WATERS. A CRITICAL REVIE OF SELECTED LITERATURE,
Bundesforschung sanstalt fuer Fischerei, Ha burg (West Germany). Institut fuer Kuesten- u Binnenfischerei Isotopenlaboratorium.
V. Dethlefsen, and H. Rosenthal.

Aquaculture, Vol 2, No 3, p 267-280, August 1973. 5 fig, 1 tab, 28 ref.

Descriptors: *Industrial wastes, *Aluminum, Herrings, Environmental effects, Water quality control, Water pollution sources, Water pollution effects, Benthos, Benthic fauna, Commercial fishing, Hydrogen ion concentration, Fish, Publications, Microscopy, Larvae.
Identifiers: *Red mud, *Gills, *North Sea, Literature review, Bauxite, Sole, Turbot, Haddock.

Red mud is an industrial waste originating from the production of aluminum from bauxite. Experiments were carried out to assess the affects on marine organisms of disposal in the southern North Sea. Red mud proved to be harmful to a variety of organisms; the most predominant effect was agglutination of gill tissues. Considering the very severe effects of suspended red mud on different marine organisms, the proposed dumping project seems inadvisable. Taking into account the hydrographic situation of the German Bight it is concluded that dumping of red mud would endanger the stocks of bottom fish and fauna and should therefore take place in regions without any fishing activities with depth greater that 3000 meters. (Katz)
W74-13091

THE EFFECTS OF HYPOXIA ON CERTAIN BLOOD AND TISSUE ELECTROLYTES ON CHANNEL CATFISH, ICTALURUS PUNCTATUS (RAFINESQUE),
Southern Illinois Univ., Carbondale. Dept. of Zoology.
W. L. Kirk.
Transactions of the American Fisheries Society, Vol 103, No 3, p 593-600, July 1974. 5 tab, 30 ref.

Descriptors: *Channel catfish, *Oxygen, *Fish physiology, *Electrolytes, Dissolved oxygen, Stress, Environmental effects, Methodology, Bioassay, Hydrogen ion concentration, Sodium, Potassium, Analytical techniques, Spectrophotometry, Laboratory tests, Biochemistry, Water pollution effects.
Identifiers: *Hypoxia, Blood chemistry, *Hematocrit, Ictalurus punctatus.

Channel catfish exhibited changes in levels of muscle and blood electrolytes during recovery from short-term hypoxia. Ten minutes of confinement in water having zero mg/liter oxygen resulted in an acidosis characterized after 1 hr of recovery by elevated blood lactate, decreased blood pH, and an increase in plasma osmolarity and hematocrit. Muscle water content was increased at this time. Later changes in these parameters appeared to be influenced by season or temperature. Plasma osmolarity dropped below control levels in June and remained depressed after 36 hr of recovery. In August plasma osmolarity fluctuated at levels above control values and had not returned to normal after 48 hr. These data indicate that electrolyte unbalance persists for many hours after blood lactate has declined to control levels and this imbalance may limit the fish's ability to tolerate further stress. (Katz)
W74-13092

ORGANOCHLORINE RESIDUES, MERCURY, COPPER AND CADMIUM IN YELLOW PERCH, WHITE BASS AND SMALLMOUTH BASS, LONG POINT BAY, LAKE ERIE,
Ontario Ministry of Natural Resources, Port Dover.
J. R. M. Kelso, and R. Frank.
Transactions of the American Fisheries Society, Vol 103, No 3, p 577-581, July 1974. 2 fig, 1 tab, 16 ref.

Descriptors: *DDT, *Polychlorinated biphenyls, *Pesticides, *Mercury, *Copper, *Cadmium, *Bass, *Perches, Freshwater fish, *Lake Erie, Metals, Heavy metals, Bioassay, Absorption, Age, Dieldrin, Chlorinated hydrocarbon pesticides, White bass, Yellow perch, Methodology, Chromatography, Analytical techniques, Seasonal, Lipids, Metabolism, Water pollution effects.
Identifiers: *Tissue analysis, Bioconcentration, Perca flavescens, Morone chrysops, Micropterus dolomieui.

Three collections of yellow perch, white bass and smallmouth bass were made in May, July, and late October for analyses of DDT, PCB, mercury, copper and cadmium. Total DDT residues were low for all species. Means ranged from 0.09 to 0.27 ug/g and exhibited no seasonal changes. No difference among species existed for DDT in spite of differing fat content, but concentrations within a species increased with increasing fat and subsequently age. PCB's were up to 6.5 times greater than DDT levels. PCB residues, lowest in yellow perch and highest in white bass, did not vary with season but increased with increasing fat. Dieldrin was low and no trends relating to season or fat were apparent. Only two specimens contained mercury residues above 0.5 ug/g. Mercury was apparently related to size and subsequently age. Copper was slightly higher in yellow perch, means ranged from 1.29 to 1.56 ug/g, but copper and cadmium were low in all species. (Katz)
W74-13093

EFFECT OF TFM AND BAYER 73 ON IN VIVO OXYGEN CONSUMPTION OF THE AQUATIC MIDGE CHIRONOMUS TENTANS,
Viterbo Coll., La Crosse, Wis. Dept. of Biology.
J. A. Kawatski, V. K. Dawson, and M. L. Reuvers.
Transactions of the American Fisheries Society, Vol 103, No 3, p 551-556, July 1974. 2 fig, 1 tab, 18 ref.

Descriptors: *Respiration, *Midges, *Larvae, *Hardness(Water), Aquatic insects, Metabolism, Toxicants, Invertebrates, Benthic fauna, Diptera, Methodology, Analytical techniques, Toxicity, Biochemistry, Larvicides, Water pollution effects.
Identifiers: TFM, Bayer 73, *Chironomus tentans, *Sublethal effects, 3-trifluormethyl-4-nitrophenol, Respirometer, In vivo, Uncouplers.

Exposure of larvae of Chironomus tentans to 2.0-8.0 mg/liter of TFM (3-trifluormethyl-4-nitrophenol) for 6 hr at 22 plus or minus 0.5C in soft water resulted in a significantly increased rate of larval oxygen consumption compared to control larvae. Maximum stimulation of oxygen consumption occurred with 8.0 mg/liter of TFM, and 1.0 mg/liter of TFM had no measurable effect on basal respiration. When water hardness was progressively increased, the effect of TFM on oxygen consumption was diminished. Bayer 73 (5,2'-dichloro-4'-nitrosalicylanilide) stimulated oxygen consumption at 0.75 and 1.0 mg/liter, had no significant effect at concentrations less than 0.75 mg/liter, and inhibited oxygen consumption at concentrations of 1.20 mg/liter or greater. Mixtures of TFM and Bayer 73, in the ratio of 98.2, had no greater effect on oxygen consumption than TFM alone. (Katz)
W74-13094

RECOVERY OF STANDING CROP AND PRODUCTION RATE OF A BROOK TROUT POPULATION IN A FLOOD-DAMAGED STREAM,
Minnesota Univ., St. Paul. Dept. of Entomology, Fisheries and Wildlife.
D. L. Hanson, and T. F. Waters.
Transactions of the American Fisheries Society, Vol 103, No 3, p 431-439, July 1974. 6 fig, 7 tab, 20 ref.

Descriptors: *Brook trout, *Rainbow trout, *Growth rate, *Standing crops, *Biomass, *Productivity, *Flood damage, Population, Environmental effects, Floods, Salmonids, Streams, Minnesota, Water pollution effects.
Identifiers: Recovery, Cohort production, Valley Creek(Minnesota).

The brook trout (Salvelinus fontinalis) population in Valley Creek, Minnesota, recovered from heavy flood damage in 1955-66 in terms of standing crop, growth, and production rates over a period of 4 to 5 years. Standing crops increased numerically by 20-fold from a low of 498/ha in 1966 to 10,882/ha in 1959, and in biomass by 6-fold from 25 kg/ha in 1966 to a maximum of 148 kg/ha in 1970. Growth rate early in the recovery period was high but decreased in successive years as fish density increased. Annual productivity was about 50 kg/ha during the flood years but increased during the recovery years to a maximum of 167 kg/ha in 1969. Cohort production for the 1965 year class was about 15 kg/ha whereas it was 190 kg/ha for the 1968 year class. After the floods, rainbow trout immigrated into the study section from downstream; although variable in year class strength, the rainbow contributed substantially to total salmonid standing crop and annual production in some years. It has apparently become permanently established, even after total recovery of the brook trout population. (Katz)
W74-13095

THE USEFULNESS OF BIOLOGICAL TESTS FOR DETERMINING THE TOXICITY OF SOME CHEMICAL COMPOUNDS IN WATERS,
Wroclaw Technical Univ. (Poland). Zaklad Biologii Sanitarnej.
M. Pawlaczyk-Szpilowa, M. Moskal, and J. Weretelnik.
Acta Hydrobiologica, Vol 14, No 2, p 115-127, 1972. Polish summary. 1 tab, 35 fig.

Descriptors: *Toxicity, *Toxicants, *Testing procedures, *Analytical techniques, *Metabolism, Copper sulfate, Pesticides, Lead, Phenols, Potassium compounds, Chlorine, Industrial wastes, Water pollution sources, Bioassay, Chlorophyll, Microorganisms, Respiration, E. coli, Bacteria, Biomass, Algae, Enzymes, Biochemistry, Herbicides, *Pollutant identification.
Identifiers: Sensitivity, Lead acetate, Aniline, TCC test, Potassium permanganate, Arquard, Aresin, Paramecium caudatum, Daphnia magna, Dehydrogenase activity.

Investigations of the toxicities of different chemical compounds indicated that different test methods had varying sensitivities. The toxic action of copper sulfate (at 0.01 mg/l), of lead acetate (at 0.1 mg/l) and of phenol (at 10 mg/l) was detected earliest by the chlorophyll method. The action of aniline (at 0.1 mg/l) was detected earliest using the T.C.C. test and that of potassium permangate (at 0.1 mg/l) and of chlorine (at 0.1 mg/l) using Warburg's manometric method. The action of arquard (at 0.001 mg/l) and of aresin (at 0.001 mg/l) was detected using Paramecium caudatum. Tested organisms exhibited an acceleration of their basic metabolic functions, especially of respiration and photosynthesis, when applying sub-limit concentrations, verging directly on toxic doses. (Katz)
W74-13097

ACCUMULATION OF SR IN MARINE ORGANISMS- I. STRONTIUM AND CALCIUM CONTENTS, CF AND OR VALUES IN MARINE ORGANISMS,
National Inst. of Radiological Sciences, Chiba (Japan). Dept. of Environmental Contamination.
T. Ueda, Y. Suzuki, and R. Nakmura.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 39, No 12, p 1253-1262, December 1973. 2 fig, 6 tab, 15 ref.

Descriptors: *Strontium, *Calcium, *Absorption, *Marine algae, *Marine animals, Strontium radioisotopes, Public health, Metals, Water pollution sources, Spectrophotometry, Analytical techniques, Sea water, Mollusks, Food chains, Crustaceans, Phaeophyta, Rhodophyta, Algae,

Chlorophyta, Methodology, Bioindicator, Water pollution effects.
Identifiers: *Tissue analysis, Bioconcentration, Concentration factor, Mugil cephalus, Gadus macrocephalus, Mollusk shell.

The amount of Sr and Ca in various marine organisms were determined by atomic absorption spectrophotometry and the concentration factor (CF; Sr organism/ Sr sea water) and observed ration (OR; (Sr/Ca)organism Sr/Ca)sea water) were calculated. The average content of Sr was highest in molluscan shell (1155 mg/kg raw) and decreased in crustacean exoskeleton, echinoderm, fish bone, brown algae and coelenterata in this order. The Ca content was also highest in molluscan shell (249 g/kg raw) among the marine organisms studied. The CF value of Sr ranged from 0.3 for a red algae to 325 for a crustacean. The CF value of brown algae was one order of magnitude higher than those of green and red algae, and was rather similar to those of hard tissues of marine animals. The OR value changed from 0.17 for shell of bivalvia (mollusca) to .82 for exoskeleton of stomatopoda (crustaces). However, the OR value of brown algae was extremely high (3.74) because of the affinity of Sr to alginic acid which was abundant in brown algae. (Katz)
W74-13098

INFLUENCE OF ECOLOGICAL FACTORS ON THE CONDITION COEFFICIENT OF A TELEOSTEAN FISH (COTTUS GOBIO L.) (INFLUENCE DES FACTEURS ECOLOGIQUES SUR LE COEFFICIENT DE CONDITION D'UN TELEOSTEEN (COTTUS GOBIO L.),
Station d'Hydrobiologie Continentale, Biarritz (France).
M. Laurent, and G. Moreau.
Annales D'Hydrobiologie, Vol 4, No 2, p 211-218, 1973. 2 fig, 5 tab, 14 ref. English summary.

Descriptors: *Fish hatcheries, *Statistical models, *Sculpins, Statistics, Analytical techniques, Age, Regression analysis, Organic wastes, Water pollution effects, Mathematical models.
Identifiers: *Condition coefficient, *Cottus gobio, Hatchery wastes.

Results of the study of samples of two different Cottus gobio (L) populations originating from two different areas of the same stream on both sides of hatchery sewage, have been statistically analyzed. A method of logarithmic differences make it possible to differentiate age groups. The analysis of condition coefficients worked out for the two populations or for each of their age groups proved more interesting than that of parameters of the regression line length/weight for revealing differences in growth. The analysis shows that, for the same age, the condition coefficient of downstream sculpins is significantly higher than that of upstream sculpins. The two areas are practically identical for all ecological conditions except the hatchery organic discharge and it is logical that this is the cause of increased condition coefficient in downstream sculpins. Variations in values of this parameter in time or space could be considered, all other conditions being equal, as corresponding to variations in organic matter content of the environment. (Katz)
W74-13099

METHODS FOR THE DETECTION OF CERTAIN PATHOGENS OF SALMONID FISHES,
Department of the Environment, Winnipeg (Manitoba). Fisheries and Marine Services.
For primary bibliographic entry see Field 5A.
W74-13100

ACUTE TOXICOLOGY TO AN ESTUARINE TELEOST OF MIXTURES OF CADMIUM, COPPER AND ZINC SALTS,
National Marine Water Quality Lab., West Kingston, R.I.
R. Eisler, and G. R. Gardner.
Journal of Fish Biology, Vol 5, p 131-142, 1973. 4 fig, 1 plate, 4 tab, 16 ref.

Descriptors: *Toxins, *Zinc, *Copper, *Cadmium, *Toxicity, Salts, Teleosts, Estuaries, Bioassay, Mortality, Methodology, Analytical Techniques, Spectroscopy, Pathology, Ions, Heavy metals, Lethal limit, Absorption, Water pollution effects.
Identifiers: *Mummichog, *Histopathology, *Synergistic effects, Fundulus heteroclitis, Renal lesions.

Effects of mixtures of chloride salts of cadmium, cooper and zinc on survival, whole body residues, and histopathology of mummichog, Fundulus heteroclitis, were investigated in synthetic seawater at 20 parts/thousand salinity and 20 degrees C. Mixtures of Cu2+ and Zu2+ as indicated by 96h bioassay studies produced more deaths than expected on the basis of toxicities of individual components. Concentrations of Cd2+ not ordinarily lethal exerted a negative effect on survival of fish intoxicated by salts of copper, zinc or both. Survivors of the 96h exposures of each of these toxicants provided useful indices of total body burdens for these metals through spectroscopy. Residues from survivors held in mixtures, especially Cd2+ and Zn2+ mixtures, did not conform to patterns observed for single elements. Renal and lateral line canal lesions occurred in all fish subjected to copper concentrations of lmg/l and higher. Tenal lesions in fish immersed in mixtures of Cu2+ and Cd2+ were characteristic of those from Cd2+; mixtures of Cu2+ and Zn2+ were typical of Cu2+ induced damage. Lesions induced in lateral line epithelium by Cu2+ were not affected by either Cd2+ or Zn2+. Epithelia lining the oral cavity were necrotized by the caustic action of high levels of Zn2+ (60 mg/l) and of Cu2+ (8 mg/l). (Katz)
W74-13101

ON THE EFFECTS OF DUMPED ORGANIC INDUSTRIAL WASTE DERIVING FROM THE PRODUCTION OF PROTEOLYTIC ENZYMES ON DENSITY, DISTRIBUTION AND QUALITY OF FISH AND SHRIMPS,
Ministere de l'Agriculture, Ostend (Belgium). Sea Fisheries Research Station.
R. DeClerck, J. Van De Velde, and W. Vyncke.
Aquaculture, Vol 2, No 4, p 323-335, December 1973. 7 fig, 1 tab, 13 ref.

Descriptors: *Shrimp, *Organic wastes, *Commercial fish, *Organoleptic properties, Laboratory tests, Water pollution sources, Water pollution effects, Shellfish, Commercial shellfish, *Industrial wastes, Mollusks, Crustaceans, Waste disposal, Water pollution effects.
Identifiers: Sole, Sprat, Dab, Whiting, Plaice.

A one year study was made in the area of a dumping ground off the Belgian coast to define the effects of dumped organic waste from the production of proteolytic enzymes on the fish and shrimp stocks. The waste material sinks rapidly to the bottom and its rate of dispersion seems rather high. Some obstacle to fishing occurs during a few days after dumping owing to the waste lumps present. The dumped material showed no negative effects on the fish and shrimp stocks. An approach to the behavior of shrimps in a aquarium system indicated no adverse effects. The organic waste did not influence the quality and shelf life of shrimps. (Katz)
W74-13102

STUDIES ON THE INFLUENCE OF PCB ON AQUATIC ORGANISMS-II. CHANGES IN BLOOD CHARACTERISTICS AND PLASMA ENZYME ACTIVITIES OF CARP ADMINISTERED ORALLY WITH PCB (IN JAPAN),
Tokai Univ., Miyamae-cho, Shizuoka (Japan). Women's Coll.
Y. Ito.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 39, No 11, p 1135-1138, November 1973. 1 fig, 1 tab, 21 ref. English summary.

Descriptors: *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticides, *Aroclors, Carp, Enzymes, Chemical analysis, Proteins, Biochemistry, Fish physiology, Water pollution effects.
Identifiers: *Blood characteristics, Plasma, Glucaronidase, Hematocrit, Glucose content.

Changes in blood characteristics and plasma enzyme activities of carp, Cyprinus carpio, fed with diets containing 5, 25 and 100 ppm of PCB (Aroclor 1248) were examined. After 7 or 20 days feeding with PCB-containing diets, the carps were sacrificed for chemical analysis. After 7 days, the blood glucose content and hematocrit value in 5 and 25 ppm groups decreased, while in the 100 ppm group both values showed an increase. After 20 days feeding, the blood glucose content and hematocrit values were elevated with the dose of PCB. The protein content, p-glucaronidase and glutamate pyruvate transaminase activities showed an increasing tendency. After 20 days feeding, the glutamate oxaloacetate transaminase activities and alkaline phosphatase activity were greatly increased. The findings suggest that plasma p-glucaronidase activity may be a useful index for examining the effect of PCB in fish. (See also W74-13104 and W74-13105) (Katz)
W74-13103

STUDIES ON THE INFLUENCE OF PCB ON AQUATIC ORGANISMS-III. RELATIONSHIP BETWEEN THE INTAKE OF PCB AND ITS ACCUMULATION IN VARIOUS TISSUES OF CARP (IN JAPANESE),
Tokai Univ., Shizuoka (Japan). Women's Coll.
Y. Ito.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 39, No 11, p 1139-1143, November 1973. 4 fig, 2 tab, 10 ref. English summary.

Descriptors: *Carp, *Polychlorinated biphenyls, Bioassay, Gas chromatography, Analytical techniques, Lipids, Absorption, Chemical analysis, Chlorine, Water pollution effects, Pollutant identification.
Identifiers: *Tissue analysis, *Bioconcentration, Hepatopancreas, Isomers, Accumulation.

Carp were fed for 7 and 20 days with diets containing 5.25 and 100 ppm of PCB (Aroclor 1248) and analyzed gas chromatographically for its accumulation in various tissues. PCB was detected in all tissues analyzed. In hepatopancreas, the greatest amount of PCB was found. It was followed by the intestine, Kidney, gill, skin, and ordinary muscle. The amount of accumulation seemed almost parallel to the crude fat content in the tissue. Accumulation factors were different among the tissues. The gas chromatographic pattern of the once-absorbed PCB was different from that of the PCB mixture administered. The hepatopancreas, gill and kidney contained relatively high concentration of low chlorine PCB isomers and lower concentrations of high chlorine PCB isomers. The inverse was true in ordinary muscle. However, no marked changes in the PCB pattern were observed in the intestine. The results suggest that each isomer of PCB is almost equally absorbed from the intestinal tract and transported to the different tissues in carp. (See also W74-13103) (Katz)
W74-13104

STUDIES ON THE INFLUENCE OF PCB ON AQUATIC ORGANISMS - IV. CHANGES IN SERUM LIPID CONTENTS AND FORMATION OF LIPID PEROXIDE IN THE TISSUES OF CARP ADMINISTERED WITH PCB ORALLY (IN JAPANESE),
Women's College, Tokai University, Miyamae-cho, Shizuoka, Japan.
Y. Ito, and T. Murata.

Bulletin of the Japanese Society of Scientific Fisheries, Vol 4, No 3, p 261-265, 1974. 1 fig, 1 tab, 6 ref. English summary.

Descriptors: *Carp, *Polychlorinated biphenyls, Arochlors, *Pesticides, Analytical techniques, Spectrophotometry, Chlorinated hydrocarbon pesticides, Metabolism, Biochemistry, Bioassay, Animal physiology, Chemistry, Pollutants, Lipids, Water pollution effects.
Identifiers: Cholesterol, Thiobarbituric acid, Hepatopancreas.

Changes in the levels of several serum lipid components in the formation of lipid peroxides in hepatopancreas, kidney and the dark muscle of carp, Cyprinius carpio, fed with a diet containing PCB (Arochlor 1248) at 250 ppm were examined. After feeding with the PCB-containing diets for 7, 14 and 21 days, the carps were sacrificed for chemical analyses. Triglyceride, total cholesterol and free fatty acid contents were increased while the ester to total cholesterol ratio was decreased in the PCB fed group. The triglyceride levels in the carp fed with PCB showed substantial increases, more than 30%, compared with those of the control fishes. The thiobarbituric acid reactive compounds were shown to increase in the hepatopancreas and the dark muscle with the administered dosage of PCB. The lipid metabolism in carp fed with the diet containing PCB is discussed, indicating the possibility of lipid peroxide formation in subcellular membranes. (See also W74-13103) (Katz)
W74-13105

CALCULATIONS OF DOSE, POPULATION DOSE AND HEALTH EFFECTS DUE TO BOILING WATER NUCLEAR POWER REACTOR RADIONUCLIDE EMISSIONS IN THE UNITED STATES DURING 1971,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-13110

PRESOWING IRRADIATION OF SEEDS OF AGRICULTURAL PLANTS,
N. M. Berezina.
Available NTIS, Springfield, Va 22161 as AEC-tr-7540, $7.00/copy, $2.25 microfiche. Atomic Energy Commission Translation AEC-tr-7540, July 1974. 190 p, 35 fig, 149 tab, 383 ref. Translated from Predposevnoe obluchenie semyan sel'skokhozyaistvennykh rastenii-Atomizdat, Moscow 1964.

Descriptors: *Irradiation, *Genetics, *Seed treatment, *Reproduction, *Viability, Biology, Radioisotopes, Radioactivity effects, Productivity, Radioecology, Agriculture, Vegetable crops, Horticulture, Economics.
Identifiers: *Mutagens, *Radiobiology.

The principal reports on the effect of stimulating doses of radiation on seeds of agricultural plants are summarized, the theoretical basis of the technique is clarified, and the method of presowing irradiation of seeds is described. Familiarity with the material presented will permit eliminating repetition in work in this direction and a more rapid approach to the practical utilization of presowing irradiation of seeds in the agricultural economy. (Houser-ORNL)
W74-13115

THE DISTRIBUTION OF PLUTONIUM IN LIQUID WASTE DISPOSAL AREAS AT LOS ALAMOS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5B.
W74-13117

KRA CANAL PROJECT: A PRELIMINARY ASSESSMENT OF NUCLEAR EXCAVATION FEASIBILITY FOR ROUTE 5A,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 8H.
W74-13119

ENVIRONMENTAL STATUS OF THE LAKE MICHIGAN REGION, VOLUME 15. MAMMALS OF THE LAKE MICHIGAN DRAINAGE BASIN,
Wisconsin Univ., Stevens Point. Museum of Natural History.
For primary bibliographic entry see Field 6G.
W74-13121

ECOLOGICAL CONSIDERATIONS OF DEPLETED URANIUM MUNITIONS,
Los Alamos Scientific Lab., N. Mex.
W. C. Hanson.
Available from NTIS, Springfield, Va. as LA-5559, $3.25/copy, $2.25/microfiche. Report No LA-5559, June 1974. 7 p, 36 ref.

Descriptors: *Nuclear explosions, *Uranium, Fallout, *Military aspects, Civil defense, *Environmental effects, *Ecology, Ecosystems, Aquatic environment, Freshwater, Plants, Absorption, Marine plants, Marine animals, Toxicity, Chemical reactions, Water pollution, Soil contamination.
Identifiers: Weapons testing.

Ecological consequences of depleted uranium (DU) released to the environment as a result of military use of DU munitions were appraised by reviewing pertinent literature. Estimates were based upon ecosystem responses to natural uranium, which is more soluble and more toxic than DU. The major ecological hazard from expended uranium munitions will be chemical toxicity rather than radiation. The alloy nature of the munitions will substantially decrease the mobility of DU and mitigate the problem. However, the ecological aspects of the chemical toxicity of DU in terrestrial ecosystems is expected to be a major consideration of expended munitions. The ecological impact of fires from the detonation material is also reported. (Houser-ORNL)
W74-13122

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED BRAIDWOOD STATION, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va. 22161 as Docket No 50456-55; $7.25/copy, $2.25/microfiche. Report No Docket STN-50456-55 and 50457-54, July 1974. 213 p, 36 fig, 48 tab, 139 ref, 7 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Illinois, Lakes.
Identifiers: *Pressurized water reactors, *Kankakee River(Ill).

The site of the proposed Braidwood Station, Units 1 and 2, is near the Kankakee River in Will County, Illinois, and will employ two pressurized water reactors. The exhaust stream will be cooled by a once-through flow of water from an artificial lake. Makeup water will be drawn from and discharged to the Kankakee River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and groundwater), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue construction permits subject to the following: (1) avoid unnecessary adverse environmental impacts from construction activities; (2) follow specified environmental monitoring programs; (3) make periodic reviews of the construction activities for adverse impacts; (4) give written notice of significant impact problems unforeseen; (5) give staff an analysis and plan of action to eliminate harmful effects disclosed during construction. (Houser-ORNL)
W74-13129

A SELECTED, ANNOTATED BIBLIOGRAPHY OF THE CIVIL, INDUSTRIAL, AND SCIENTIFIC USES FOR NUCLEAR EXPLOSIONS.
Technical Information Center (AEC), Oak Ridge, Tenn.
Available from NTIS, Springfield, Va, as TID-3522-R9-S2; $5.75/copy, $2.25/microfiche. Report No TID-3522-R9-S2, April 1974. R. C. Kelly, Compiler. 146 p, 478 ref.

Descriptors: *Bibliographies, *Nuclear explosions, *Nuclear engineering, *Cost-benefit theory, *Benefits, Public benefits, Excavation, Underground, Secondary recovery(Oil), Natural gas, Hydrofracturing, Documentation, Publications, Environmental effects, Radioactive waste disposal, Mining, Water, Management.
Identifiers: *Plowshare.

A program to study the feasibility of using nuclear explosions for peaceful purposes has many potential pllications in such areas as excavation of harbors, canals, and mountain passes, production of transplutonium isotopes, neutron physics research, gas and oil recovery and storage, waste disposal, mining, and water management. Laboratory and field experiments are currently under way to develop basic technology and to evaluate proposed applications. This supplement to bibliography TID-3522 (9th Rev.) contains 478 references to reports and published literature on the USAEC's Plowshare Program that were published in Volumes 26 and 27 (January 1, 1972 to June 30, 1973) of Nuclear Science Abstracts. The references are arranged by subject category. Experiment, Foreign Literature, Corporate Author, Personal Author, Subject, and Report Number Indexes are included. (Houser-ORNL)
W74-13133

HABITATS OF SMALL MAMMALS AT WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT,
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
S. L. Iverson, and B. N. Turner.
Available from NTIS, Springfield, Va 22161 as AECL-3956, $4.25/copy, $2.25/microfiche. Report No AECL-3956, December 1973. 58 p, 3 fig, 22 tab, 27 ref.

Descriptors: *Speciation, *Varieties, *Surveys, Data collections, *Habitats, *Mammals, *Mixed forests, Coniferous forests, Deciduous forests, Environment, Environmental effect, Nuclear energy, Effluents, *Canada.
Identifiers: Whiteshell Nuclear Research Establishment(Manitoba).

The small mammals in the area around the Whiteshell Nuclear Research Establishment in southeastern Manitoba were sampled by approximately 110,000 snap-trap nights in a 5-yr period. Habitats trapped were divided into major types on the basis of the tree species present, and occurrences of the different species of shrubs and herbs in each habitat type were noted. The major

habitats were mixed deciduous, aspen, ash, mixed coniferous, black spruce and fir forests; black spruce bog and open field. The small mammal component of the mixed deciduous forest was dominated by Peromyscus maniculates and Clethrionomys gapperi. (Houser-ORNL)
W74-13137

MAN'S IMPACT ON THE COLORADO RIVER IN THE GRAND CANYON,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 4C.
W74-13149

QUANTITY OF BACTERIA AND DESTRUCTION OF ORGANIC MATTER IN BOTTOM DEPOSITS OF THE SARATOV WATER STORAGE BASIN (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W74-13156

CHARACTERISTICS OF BACTERIA IN WATER LAYERS OF THE SOUTH BAIKAL, (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W74-13157

A STUDY OF DIETHYLENETRIAMINE IN CONNECTION WITH ITS HYGIENIC STANDARDIZATION IN WATER BODIES (IN RUSSIAN),
Sanitarno-Gigenicheskii Meditsinskii Institut, Leningrad (USSR).
E. I. Trubko, and E. V. Teplyakova.
Gig Sanit. Vol 37, No 7, p 103-104. 1972. Illus.
Identifiers: Guinea pig, Rabbit, Standardization, Organoleptic properties, *Diethylenetriamine, DTA, Water pollution effects, *Toxicity, *Lethal limit, Organic wastes.

The maximum allowable concentration of diethylenetriamine (DTA) in water was determined to be 0.2 mg/l with respect to the organoleptic properties of contaminated water. Water with 20 mg of DTA/l, administered to rabbits and guinea pigs in a chronic experiment, caused no alterations in the organism.--Copyright 1974, Biological Abstracts, Inc.
W74-13165

LIMNOLOGICAL, ICHTHYOLOGICAL, AND PARASITOLOGICAL INVESTIGATIONS ON ARKANSAS RESERVOIRS IN RELATION TO WATER QUALITY,
Arkansas Univ., Fayetteville. Dept. of Zoology.
For primary bibliographic entry see Field 2H.
W74-13167

COMPARISON OF BACTERIAL AND PHYTOPLANKTON POPULATIONS UNDER NATURAL AND LABORATORY CONDITIONS,
Geological Survey, Albany, N.Y.
T. A. Ehlke.
Journal of Research, US Geological Survey, Vol 2, No 5, p 533-539, September-October, 1974. 1 fig, 4 tab, 24 ref.

Descriptors: *Algae, *Bacteria, *Lakes, *Limnology, *New York, Eutrophication, Nutrients, Plankton, Symbiosis, *Cyanophyta, Ecology, Primary productivity, Phytoplankton.
Identifiers: *Oneida Lake(NY).

Bacteria and blue-green algae were isolated from Oneida Lake, N.Y., and other sources. The blue-green algae Anabaena flos-aquae, Anabaena spiroides, Gloeotrichia echinulata, and Microcystis aeruginosa were grown under laboratory conditions and were separated into unialgal cultures. The bacterial population living in association with the unialgal blue-green algae differed significantly from the bacterial flora of Oneida Lake. Bacillus, Pseudomonas, Aeromonas, and Zoogloea were the most frequently occurring genera of bacteria from the lake, whereas Flavobacterium, Achromobacter, and Pseudomonas were the most common bacteria isolated from laboratory blue-green cultures. Nutritional and physiological characteristics of bacteria isolated in the laboratory were more uniform than those isolated from the lake. (Knapp-USGS)
W74-13182

ENVIRONMENTAL LEAD: A SURVEY OF ITS POSSIBLE PHYSIOLOGICAL SIGNIFICANCE,
British Columbia Univ., Vancouver. Dept. of Geological Sciences.
For primary bibliographic entry see Field 5B.
W74-13233

DRINKING WATER AS A SOURCE OF LEAD POLLUTION,
Glasgow Univ. (Scotland). Dept. of Materia Medica.
For primary bibliographic entry see Field 5B.
W74-13234

RAPID METHODS FOR THE DETERMINATION OF FAECAL CONTAMINATION IN OYSTERS,
New South Wales Univ., Kensington (Australia). Dept. of Food Technology.
For primary bibliographic entry see Field 5A.
W74-13238

RADIONUCLIDE UPTAKE BY SOME FRESHWATER HYDROBIONTS, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Inst. of Botany.
For primary bibliographic entry see Field 5B.
W74-13240

TEMPERATURE-TOXICITY MODEL FOR OIL REFINERY WASTE,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5B.
W74-13264

VIRUSES--WHAT IS THEIR SIGNIFICANCE IN WATER SUPPLIES,
Environmental Protection Agency, Boston, Mass. Region I.
F. B. Taylor.
Journal of the American Water Works Association, Vol 66, No 5, p 306-311, May, 1974. 3 tab, 11 ref.

Descriptors: *Viruses, *Public health, *Potable water, *Water supply, Safety, Water pollution control, Water pollution effects, *Water treatment.
Identifiers: Public relations, Virus detection.

The attitude toward the safety and significance of viruses in water supplies has changed over the last few years in both public and water treatment areas. How to protect and inform the public without producing unneccessary scares is the subject of this article. It is concluded that research is needed in the fields of virus detection methodology and dpidemiological techniques for detecting viral disease in the general population. Also, the water utility and public health professions must be careful to avoid an attitude of either complacency or doom concerning the entire issue of virus detection. (Sandoski-FIRL)
W74-13272

EFFECTS OF INTRACELLULAR NUTRIENT POOLS ON GROWTH DYNAMICS OF PHYTOPLANKTON,
Utah Water Research Lab., Logan.
W. J. Grenney, D. A. Bella, and H. C. Curl.
Journal Water Pollution Control Federation, Vo 46, No 7, p 1751-1760, July, 1974. 7 fig, 2 tab, 3 ref.

Descriptors: *Mathematical models, *Model stu dies, *Phytoplankton, Simulation analysis, Data collections, Aquatic populations, Nitrogen *Nutrient requirements, *Growth rates.

A three-compartment mathematical model ha been developed to represent a phytoplankto population having the capacity to store nitrogen i a nitrate-limited environment. Parameters were estimated by fitting the model to equilibrium data from two chemostat experiments. The model the was run to simulate the transient chemostat condi tions and the model response was compared wit the observed data. The model is shown to provid a reasonable representation of the sudden popula tion surges associated with intracellular nutrien storage. (Sandoski-FIRL)
W74-13302

LEVELS OF MIREX AND SOME OTHER OR GANOCHLORINE RESIDUES IN SEAFOOD FROM ATLANTIC AND GULF COASTAL STATES,
Pacific Northwest Forest and Range Experimen Station, Corvallis, Oreg. Forestry Sciences Lab.
For primary bibliographic entry see Field 5A.
W74-13315

POLLUTION OF A STORAGE RESERVOIR BY ROOSTING GULLS,
Public Health Lab. Service, Leeds (England).
For primary bibliographic entry see Field 5D.
W74-13316

RESIDUES IN FISH, WILDLIFE, AND ESTUA RIES,
Environmental Protection Agency, Gulf Breeze Fla. Gulf Breeze Environmental Research Lab.
P. W. Borthwick, G. H. Cook, and J. M. Patrick, Jr.
Pesticides Monitoring Journal, Vol 7, No 3/7 March, 1974. 3 ref.
Identifiers: *White catfish, Blue crabs.

In June 1972, a collection was taken of estuarine sediments, crabs, shrimps, and fishes, two years after aerial applications of mirex bait for con trolling fire ants in coastal regions near Char leston, South Carolina. Previous monitorin (October 1969 to June 1971) determined levels o mirex in animal samples as: crabs, 0-0.60 ppm shrimps, 0-1.3 ppm; and fishes, 0-0.82 ppm. Mire was recently shown present in three species of fis (white catfish, 0.021 ppm; blue-gill, 0.047 ppm carp 0.12 ppm) and blue crabs (0.026 ppm) at fres water stations. There was no mirex detected in 3 other species examined taken from nine saline sta tions in the estuaries after a period of restricte pesticide use. No mirex was found at the botto sediment samples. (Leibowitz-FIRL)
W74-13317

LEAD AND CADMIUM CONTENT O SELECTED OREGON GROUNDFISH,
Oregon State Univ., Astoria. Seafoods Lab.
E. A. Childs, and J. N. Gaffke.
Journal of Food Science, Vol 39, No 4, p 853-854 July/August, 1974. 1 tab, 12 ref.

Descriptors: *Dietary effects, *Fish, *Lead *Cadmium, Toxicity, Spectrophotometry, Metals Analytical techniques, Sampling, *Oregon, Wate pollution effects.
Identifiers: Groundfish.

An experimental study was undertaken to deter mine the lead and cadmium content of selected groundfish in Oregon. Samples were obtained from commercial fishing processors. The amounts of Pb and Cd were measured by atomic absorption

pectrophotometry following extraction of the
ietals into 2-pentanone. The lead content was in
ost cases less than 0.20 ppm; Cd was less than
.10 ppm. These data were in the general range of
b and Cd for canned fruit and vegetables and in-
icate that Oregon groundfish would nde a large
roportion of lead or cadmium in a diet. (Prague-
IRL)
/74-13318

CCUMULATION OF DIETARY OLYCHLORINATED BIPHENYLS (AROCLOR 254) BY RAINBOW TROUT (SALMO GAIRDERI),
regon State Univ., Corvallis. Dept. of Food
cience and Technology.
. J. Lieb, D. D. Bills, and R. O. Sinnhuber.
ournal of Agricultural Food Chemistry, Vol 22,
o 4, p 638-642, July/August, 1974. 6 fig, 4 tab, 26
f.

escriptors: *Rainbow trout, *PCB's, *Gas chro-
atography, *Dietary effects, Aquatic life, Tox-
ity, Pollutant dientification, Waste water treat-
ent.

he accumulation of PCB's (Aroclor 1254) by a
ount Shasta strain of rainbow trout (Salmo
irdneri) from a dietary level of 15 ppm was
etermined. Instrumentation included a gas chro-
atography equipped with an electron capture de-
ctor. The relative concentration (parts per mil-
on) of PCB's in the fish stabilized; absolute quan-
ies (micrograms of PCB/fish) increased as the
sh grew. The total retention of PCB's from the
et was 68 percent for a 32-week feeding period.
he distribution of PCB's was fairly constant in
e lipid portion of various tissues. Even when the
sh were starved, PCB's did not appear to be
iminated from the trout after PCB exposure
eased. No mortalities were attributed to PCB tox-
ity. (Prague-FIRL)
/74-13321

OME EFFECTS OF TURBULENCE AND IGHT ON COMPETITION BETWEEN TWO PECIES OF PHYTOPLANKTON,
niversity of Southern California, Los Angeles.
llan Hancock Foundation.
. J. Bakus.
vest Pesq. Vol 37, No 1, p 87-99. 1973. Illus.

escriptors: *Turbulence, *Light intensity,
Phytoplankton, Photosynthesis.
entifiers: *Scenedesmus, *Stichococcus.

ome effects of turbulence and light were studied
laboratory populations of the freshwater
ytoplankton Scenedesmus obliquus and
ichococcus sp. between April and Aug. 1971 at
e Instituto de Investigaciones Pesqueras, Bar-
lona, Spain. Aeration of cultures enhances both
ecific growth rates and the final yield of cells in
ichococcus and Scenedesmus. Stichococcus
one reproduces more rapidly than does
cenedesmus alone. In combination, the final
eld of cells of Stichococcus is reduced but its ini-
l specific growth rate remains approximately the
me. Neither the specific growth rate nor the final
eld of cells of Scenedesmus show differences
ue to the presence of Stichococcus, with few ex-
ptions. The inhibition of Stichococcus by
cenedesmus is suggested. However, the competi-
ve advantage in the final yield of cells of
cenedesmus over Stichococcus can be reversed
the presence of a combination of turbulent
ater movements and decreased illumination. The
portance of turbulence to phytoplankton growth
y aeration) is suggested by the fact that popula-
ons in slightly illuminated flasks had specific
owth rates and final yields of cells comparable to
ose in fully illuminated flasks.--Copyright 1974,
ological Abstracts, Inc.
74-13331

OBSERVATIONS ON PLANKTONIC DIATOMS IN THE LAKE-RIVER SYSTEM LAKE MJOSA-LAKE GYEREN-RIVER GLAMA, NORWAY,
Norsk Institutt for Vannforskning, Blindern.
For primary bibliographic entry see Field 2H.
W74-13341

LARGE ECOLOGICAL ZONES OF LAKE CHAD, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Fort-Lamy (Chad).
For primary bibliographic entry see Field 2H.
W74-13356

SURVIVAL OF SALMONELLA TYPHIMURIUM IN ARTIFICIAL AND COASTAL SEA WATER,
Rhode Island Univ., Kingston. Dept. of Microbiology.
J. J. Graham, and J. Mc N. Sieburth.
Rev Int Oceanogr Med, 29, p 5-29, 1973, Illus.
Identifiers: Carbon, Metals, Salinity, *Salmonella, *Survival, Trypticase, Organic matter, Nutrients, Sea water.

As little as 2.5 mg organic C/l as trypticase is enough to offset in the antibacterial activity of ASW(artificial sea-water). Increasing organic matter caused an increase in growth rate and final cell numbers/ml. Without nutrients, salinities of 10%, 20% and 30% had approximately the same antibacterial activity. When nutrients were added, the greater the salinity the greater was growth limitation. Distilled water, either with or without nutrients, had the same antibacterial activity as sea-water (SW) without nutrients, thus indicating a requirement for salts and trace metals for growth. Above 15C the higher temperature the greater was the antibacterial activity in unsupplemented SW and the greater the growth in supplemented SW. Unsupplemented ASW, whose 3 component solutions were autoclaved separately to avoid trace metal precipitation, showed the usual comparatively strong antibacterial activity. In vitro work supports in situ observations that of the 3 parameters studied, salinity, dissolved organic C, and trace metals; the latter has a major influence which is modified by organic C levels.--Copyright 1974, Biological Abstracts, Inc.
W74-13361

SURVIVAL RATE OF ASCARID EGGS IN THE SOIL AND SEDIMENT OF SEWAGE IN OOZE AREA IN THE VOLGOGRAD REGION, (IN RUSSIAN),
Regional Sanitary-Epidemiological Center, Volgograd (USSR).
Z. K. Drozdova, N. A. Romanenko, I. G. Lapshina, N. L. Andreeva, and N. I. Vlasova.
Med Parazitol Parazit Bolezn, Vol 42, No 2, p 146-148, 1973. English summary.
Identifiers: *Sediments, Sewage, *Ascarids, *USSR(Volgograd).

The study established that the survival time of ascarid eggs in the soil varies from: 23-29 days on the surface, up to 1 1/2 yr at a depth of 10 and 20 cm, over 2 1/2 yr at a depth of 40 and 60 cm of clean soil. In the soil contaminated with the sediment of sewage survival time was up to 1 yr at a depth of 10 and 20 cm and up to 1 1/2 yr at a depth of 40 and 60 cm in the sediment of sewage on ooze grounds survival time ranged from 1-3 mo.--Copyright 1974, Biological Abstracts, Inc.
W74-13362

EFFECT OF THE PRESENCE OF DETERGENTS IN THE WATER ON THE APPEARANCE OF LINDANE IN THE LIVER AND FAT TISSUE OF WHITE RATS, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Epidemiologii, Mikrobiologii i Gigieny, Vilnius (USSR).
D. G. Krasilshchikov.
Gig Sanit. Vol 37, No 9, p 96-97, 1972.
Identifiers: *Alkylbenzene sulfonate, *Detergents, Fat, Hexachloran, *Lindane, Liver, Rates, Tissue, Water pollution effects.

Rats were given hexachloran (lindane), alkylbenzene sulfonate or a binary mixture of both intragastrically at 1/5 LD50. The accumulation of hexachloran in liver and fat tissue was analyzed by thin-layer chromatography. The combination of both substances tended to increase th hexachloran content in both tissues compared to administration of only hexachloran. The effect was less pronounced in rats given the same mixtures at 1/10 LD50 for 20 days. The hexachloran content in fat tissue was greater than that in the liver in both experiments. The capacity of alkylbenzene sulfonate to emulsify the pesticide may have affected resorption of hexachoran from the gastrointestinal tract into organs and tissues.--Copyright 1973, Biological Abstracts, Inc.
W74-13372

HYGIENIC STANDARDIZATION OF THE COMPONENTS OF RUBBER PRODUCTION SEWAGE IN RESERVOIR WATER, (IN RUSSIAN),
Permskii Politekhnicheskii Institut (USSR).
Ya. I. Vaisman, N. V. Zaitseva, and A. V. Mikhailov.
Gig Sanit, Vol 38, No 2, p 17-21, 1973. English summary.
Identifiers: Mouse, *Rubber, *Sewage, *Toxicity, Captax, Altax, Thiuram, Organoleptic propertikes.

Maximum allowable concentrations (MAC) of rubber production generated affluents in reservoir water were determined from organoleptic properties and in acute and chronic poisoning tests performed on mice and cats. MAC in water of sulfeneamide BT, blue dye No. 3, thiosol, mitrosophenol, and indotoluidine were 0.05; 10.0; 0.5; 0.15, and 1 mg/l, respectively. Organoleptic properties constitute a limiting factor for the permissible concentrations in water of captax, altax, and thiuram D.--Copyright 1973, Biological Abstracts, Inc.
W74-13373

CHARACTERISTICS OF THE ACTION OF DISTILLED DRIMKING WATER ON THE STATE OF THE GASTROINTESTINAL TRACT, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
A. I. Bokina, and V. K. Fadeeva.
Gig Sanit, Vol 38, No 2, p 93-94, 1973.
Identifiers: *Distilled water, Potable water, Kinase, Phosphatase, Gastrointestinal tract, Public health.

Gastric juice acidity tests performed in healthy subjects who consumed distilled water for 1 to 5 or more yr revealed significantly elevated frequency of hypoacidic gastric juice among such subjects (40-42%, as compared to a normal value of about 25%). No significant changes in the enterokinase and alkaline phosphatase levels in children who consumed desalinated drinking water for at least 1 yr wer noted.--Copyright 1973, Biological Abstracts, Inc.
W74-13374

DATA ON THE BIOLOGY OF SELENGI OMUL JUVENILES COREGONUS AUTUMNALIS MIGRATORIUS (GEORGI), (IN RUSSIAN),
A. A. Sorokina, and V. N. Sorokin.
Vopr Ikhtiol, Vol 12, No 4, p 704-712, Illus, 1972.
Identifiers: *Benthos, *Coregonus, Larvae, Omul, Plankton, *Selengi, *USSR(Lake Baikal), Dissolved oxygen, Carbon dioxide.

Larvae and juveniles from the lower Selengi River and adjacent portions of Lake Baikal (USSR) were investigated from 1965-1969. After downstream

migration into the Selengi, some young remained in delta waters to feed. In delta waters the growth rate was high at 1st and decreased by the end of May due to deteriorating conditions. In the shallows the pattern was reversed, with growth rates increasing from May to June to July. The intensity of feeding on zooplankton and benthos was high in all areas except for the shallows, where it was low in May. The juveniles were highly adaptable to changing environmental conditions, including substantial variations in dissolved O2 and CO2, pH, temperature and food supply.--Copyright 1973, Biological Abstracts, Inc.
W74-13376

PROBLEM OF FREE AMINO ACIDS IN FRESHWATER PLANKTON AND ITS MEDIUM, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Inst. of Botany.
K. K. Yankyavichyus, S. F. Budrene, A. Y. Baranauskene, V. N. Lubyanskene, and G. Y. Yankavichyute.
Liet Tsr Moksiu Akad Darb Ser B, 2, p 3-17, 1972. English summary.
Identifiers: *Amino-acids, Lysine, Methionine, Pediastrum, Peptone, *Phormidium, *Plankton, *Scenedesmus, *Decomposition.

The decomposition of methionine, lysine and peptone was found to exert a positive effect on planktonic organism development, depending on concentration and test organism. Methionine and lysine were found to enhance growth in Scenedesmus quadricauda, Pediastrum boryanum and Phormidium uncinatum and to enhance amino acid metabolism within the cells. If the concentration of amino acids becomes too high, amino acid metabolism within cells ceases. Different aquatic habitats were found to have different amounts of free amino acids and different planktonic biomasses.--Copyright 1973, Biological Abstracts, Inc.
W74-13377

SOME HYDROBIOLOGICAL PROBLEMS OF THE GROUNDWATER ENRICHMENT AT THE BUDAPEST METROPOLITAN WATERWORKS,
Lajos Kossuth Univ., Debrecen (Hungary). Zoological Inst.
J. Szabo, G. Pusztai, G. Devai, I. Davai, and Karoly Gefferth.
Acta Biol Debrecina, 9, p 197-209, 1971(1972), Illus.
Identifiers: Metropolitan waterwords, *Eutrophication, *Hungary(Budapest), *Municipal waters.

Hydrobiological and hydrochemical processes occurring in settling and percolating basins of the Budapest Municipal Waterworks (Hungary) were studied with special regard to the formation of algal blooms. Considerable differences between the 2 basins regarding their hydrochemical and hydrobiological properties were determined. The sealing of percolating basins was caused by the formation, on the bottom of the basin, of a coherent algal vegetation and by the accumulation and settling of inorganic and organic materials, which thus became enbedded in the algal layer.--Copyright 1973, Biological Abstracts, Inc.
W74-13383

STUDY OF NORMAL MICROFLORA OF BREAM (ABRAMIS BRAMA) OF THE VOLGA-CASPIAN REGION, (IN RUSSIAN),
L. A. Zubkova.
Tr Kasp Nauchno-Issled Inst Rybn Khoz, 26, p 257-260, 1971.
Identifiers: Abramis, *Bream, Flora, Microorganism, *USSR(Volga River), *Fish diseases.

The epizootic situation has become complicated considerably in the past 3-4 yr in the Volga delta and North Caspian, USSR. Fishes with 'ulcerous' lesions are found frequently in commercial catches. The material was collected in region of Ryulenii and Rakushechnyi islands (North Caspian) and in the Volga river in the region of the Muzhich'ya fishery. Twenty-eight species of microorganisms, gram-positive and gram-negative in equal numbers, were isolated from the blood and organs of the bream. Withe the exception of 2 conditionally pathogenic species, the isolated microflora is characterized mainly by saprophytes. The isolated conditionally pathogenic species can cause disease when the fishes are weakened by unfavorable environmental conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-13390

NEW CASES OF MASSIVE DEVELOPMENT OF PRYMNESIUM PARVUM CART, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
G. P. Krasnoshchek, L. S. Abramovich, and V. R. Shemchuk.
Gidrobiol Zh Vol 8, No 5, p 99-100. 1972.
Identifiers: *Fish ponds, *Prymnesium.

The massive development of Prymnesium parvum was noted in fishponds geographically remote from one another with different water supplies (atmospheric precipitation and discharge waters from rice fields). Therefore its appearance can be expected in other ponds whose water contains less than 500-600 mg Cl/liter.--Copyright 1973, Biological Abstracts, Inc.
W74-13391

RATE OF SULFATE REDUCTION IN MUD DEPOSITS OF PONDS OF THE 'KARAMET-NIYAZ' FISH FARM, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
O. I. Bogdanovich.
Gidrobiol Zh. Vol 8, No 5, p 79-82. 1972.
Identifiers: Bacteria, Carp, Oxygen, Ponds, Rate, *Sulfates, *Fish farms, Fish kills, USSR.

The ponds of the 'Karamet-Niyaz' fish farm (USSR) had a high rate of sulfate reduction, which was indicated by the high number of sulfate-reducing bacteria and content of sulfides and H2S in the mud deposits. This situation is especially threatening for the fishes in the sense of fish kills due to lack of O2 in the summer and fall months.--Copyright 1973, Biological Abstracts, Inc.
W74-13392

PARASITES OF YOUNG SILVER CARP HYPOPHTHALMICHTHYS MOLITRIX (VAL.) AND GRASS CARP CTENOPHARYN-GODON IDELLA (VAL.) IN THE AMUR RIVER, (IN RUSSIAN),
S. S. Yukhimenko.
Izv Tikhookean Nauchno-Issled Inst Rybn Khoz Okeanogr. 77 p 151-159. 1972.
Identifiers: *Carp, Ctenopharyngodon, Hypophthalmichthys, Thelohanellus, Trichodina, *USSR(Amur River), *Fish parasites.

Complete parasitological autopsy was used to investigate 575 species of uneven-aged young silver carp and 167 specimens of yound grass carp caught in the central and lower reaches of the Amus, USSR. Species (34) of parasites were found in the silver carp and 20 spp. in the grass carp. The eggs and free embryos of the silver and grass carp with a body length to 7.0-7.3 mm are free of parasites. When the embryos reach a body length of more than 7.5 mm they are infected by parasites whose quantitative and qualitative composition varies with the age of the fish. Pathogenic parasites as Thelohanellus oculileucisci and Trichodina nobilis are found in fishes of young age groups.--Copyright 1973, Biological Abstracts, Inc.
W74-13395

INFECTION OF FISH WITH OPISTHORCH FELINEUS IN WATER BODIES OF TH VORONEZH REGION, (IN RUSSIAN),
Voronezhskii Meditsinskii Institut (USSR). Dep of Biology and General Genetics.
N. I. Krasilnikova.
Med Parazitol Parazit Bolezn. Vol 42, No 2, p 22 227. 1973, English summary.
Identifiers: *Opisthorchis, Felineus, *Fi parasites, *USSR(Voronezh region).

Fish from water bodies of Voronezh regio USSR, are infested with O. felineus larva Among 561 specimens of fish examined 264 we carriers of metacercaria of Opisthorchis (47.05% The species of metacercaria was determin morphologically and experimentally by inocul tion into experimental animals.--Copyright 197 Biological Abstracts, Inc.
W74-13396

ICHTHYOPHTHIRIUS MULTIFIL (FOUQUET) IN THE MIRROR CAR CYPRINUS CARPIO L.: I. COURSE OF INFE TION,
Agricultural Research Organization, Dor (Israe Fish and Aquaculture Station.
R. S. Hines, and D. T. Spira.
J Fish Biol. Vol 5, No 3, p 385-392. 1973, Illus.
Identifiers: *Carp, *Ichthyophthirius, *Fi parasite.

Mirror carp were infected with I. multifiliis und standardized conditions. The size and number parasites at selected sites on the body we recorded during the course of the infection. Init exposire to 40 mature parasites resulted in a m infection with 100% recovery after 18 day Recovered fish did not appear to be carriers of t parasite. Exposure to 400 parasites resulted 100% mortaility between 22-25 days. The grow rate of the parasite was linear. Parasites were mo numerous in the dorsal surface of the fish than the lateral or ventral surface. The increase parasite numbers during the disease was greater the gills than in the skin.--Copyright 1973, Biolo cal Abstracts, Inc.
W74-13397

LEPTOSPIROSIS IN A RURAL SURROUN ING: EPIDEMIOLOGICAL AND PROFE SIONAL ASPECTS AMONG FARMERS (FRENCH),
Institut Pasteur, Paris (France). Laboratoire d Leptospires.
M. Mailloux.
Rev Epidemiol Med Soc Sante Publique. Vol 2 No 1, p 65-77. 1973. Illus. (English summary).
Identifiers: *Leptospirosis, *Human disease Farmers, Guadeloupe, *Leptospira, Ve tors(Biological).

Farmers are likely to contract leptospirosis, world-wide zoonosis. The organisms are tran mitted through water to domestic animals by wi animals, the main reservoir hosts. Farmers a stock-breeders are frequently and repeatedly contact with animals and water, mud..., which a counts for the multiplicity of cases occurring rural areas. In France, Leptospira icterohaemo hagiae represents 1/3 of the reported cases; pomona and L. australis respectively 13% a 10%. L. grippotyphosa is found with a frequen of 14.5 instead of 29.5 (general statistics). Wh most cases of leptospirosis, 80%, are due to wate in rural populations 21% only are infected fro water or mud, 53% from animals, and 1/4 fro both main factors involved (water and animal As for the geographical distribution of agricultur leptospirosis in France, various foci can be loca ized: Ile-de-France, Anjou, the district of To louse, the lower part of the Rhone Valley a Bouches-du-Rhone--where L. canicola prominent, Bourgogne and Lorraine. L. i terohaemorrhagiae is spread throughout the who country. Overseas, in Martinique and Guadeloup

otospirosis are only contracted by rural popula-ons; the same applies to Reunion Island. The verity of infection depends on the particular sceptibility and antecedents of the patient. In orocco, farmer, washerwomen are liable to in-ction from the irrigation canals. In France, L. ic-rohaemorrhagiae, L. pomonae and L. tarassovi otospirosis are recognized as professional dis-ses by agricultural regulations.--Copyright 1973, ological Abstracts, Inc.
74-13399

FECT OF URBAN SEWAGE ON THE SANI-ARY AND BIOLOGICAL REGIME OF THE OPAN RIVER (IN RUSSIAN),
harkov State Univ. (USSR).
V. Dogadina, and N. A. Chukhlebova.
drobiol Zh. Vol 8, No 5, p 93-97. 1972. Illus.
entifiers: Urban, *USSR(Lopan River), ewage effluents, Waste waters.

ring the past 45 yr the sanitary state of the river s deteriorated considerably, evidenced by in-eased total water mineralization and concentra-n of organic matter, deterioration of the O2 gime, and increase of the total bacterial con-nination of the river water. The constant entry new pollutants into the river caused a change of species composition of algae. The waste ters being discharged into the river from the harkov (USSR) plant under high pressure and at gh speeds have an adverse effect on the sanitary d biological regime, which also has a deleterious fect on the qualitative composition of algae. The scharge of sewage generally exceeds the self-pu-ying capacity of the river.--Copyright 1973, ological Abstracts, Inc.
74-13401

IE KINETICS OF INORGANIC CARBON-MITED ALGAL GROWTH,
ssouri Univ., Columbia.
L. King, and J. T. Novak.
urnal Water Pollution Control Federation, Vol , No 7, p 1812-1816, July, 1974. 5 fig, 5 ref.

escriptors: *Chlorophyta, Carbon dioxide, hotosynthesis, Carbon cycle, *Growth rates, ater analysis, Data collections, *Kinetics, Water llution effects.
entifiers: Selenastrum capricornutum, enedesmus quadricauda.

is indicated through recalculation and recasting previously presented data that Selenastrum pricornutum and Scenedesmus quadricauda, o green algae, both respond in a kinetic fashion the free carbon dioxide concentration of a water r their photosynthetic carbon source. Also, their ecific growth rate is not related directly to the al inorganic carbon content of the water. andoski-FIRL)
74-13410

UDIES ON GULL LAKE, MICHIGAN: II. UTROPHICATION: EVIDENCE AND PROG-OSIS,
niversity of East Anglia, Norwich (England). hool of Environmental Sciences.
Moss.
eshwater Biol. Vol 2, No 4, p 309-320, 1972. us.

escriptors: *Algae, *Diatoms, Growth rates, utrients, Phosphates, *Eutrophication.
entifiers: Gull Lake(Michigan).

idence is presented, from studies on deox-enation of the hypolimnion and from examina-n of the diatom frustules in a surface mud core, at Gull Lake (Michigan, USA) is becoming ogressively more fertile. This appears to be a cent phenomenon, having begun in the last cen-y. Phosphate is identified, from bioassay ex-riments, as the key nutrient limiting to algal growth. Probably future changes in the lake are discussed, and the existence of 'natural' eutrophi-cation is denied.--Copyright 1973, Biological Ab-stracts, Inc.
W74-13456

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA, PART II. BIOLOGICAL IN-VESTIGATIONS.
For primary bibliographic entry see Field 5B.
W74-13461

OBSERVATIONS ON THE HYDROLOGY AND MARINE ORGANISMS OF THE TIDAL COLORADO RIVER AND ADJACENT WATERS, TEXAS, FEBRUARY-JUNE 1962,
National Marine Fisheries Service, Galveston, Tex. Biological Lab.
For primary bibliographic entry see Field 5B.
W74-13463

BREEDING CALANOIDA AND CYCLOPOIDA (COPEPODA, CRUSTACEA) IN THE WATERS OF THE GUAMA, CAPIM AND TOCANTINS REGIONS, WITH A NOTE ON THE ACCOM-PANYING FAUNA, (IN PORTUGESE),
Instituto de Pesca, Parque Fernando Costa, Sao Paulo (Brazil).
M. N. Cipolli, and M. A. J. De Carvalho.
Pap Avulsos Zool (Sao Paulo). Vol 27, No 8, p 95-110, 1973.

Descriptors: Rivers, *South America, Algae, Zooplankton, *Aquatic life, Crustaceans, Rotifers, Protozoa, Larvae, Pollutants, Water pollution, Aquatic microbiology, Aquatic insects.
Identifiers: *Brazil, *Calanoida, Capim, Cladocera, Copepoda, Crustacea, *Cyclopoida, Diaptomus-coronatus, Diaptomus-henseni, Diaptomus-iheringi, Diaptomus-jatobensis, Ecto-cyclops-rubescens, *Guama, Halicyclops-venezuelaensis, Mesocyclops- brasilianus, Meso-cyclops-longisetus, Microcyclops-varicans, Oithona-gessneri, Pseudodiaptomus-gracilis, Pseudodiaptomus-richardi, Pseudodiaptomus-sp, Tocantins, Tropocyclops-sp.

With a 78 micro meshed net quantitative vertical and horizontal and qualitative samples of zooplankton in black, white and clear waters were collected in the reqion of the rivers Guama, Capim and Tocantins (Brazil), during the 'Expedicao Per-manente da Amazonia', in Aug. and Sept. 1970. The region of the Capim River where most (77.7%) of the visited tributaries contain black water, is poorer in zooplankton than the Tocantins River re-gion where only 10% of the tributaries are of the black water type and 40% contain white water. In the white (clayish) waters (pH around 7) the greatest variety of animal life occurs: the crustaceans (Copepoda and Cladocera) predominate, and the rotifers are 2nd in abundance and frequency. In the transparent (pH about 6) waters, in order of decreasing abundance, are the crustaceans, the colonial ciliates, the rotifers and veliger larvae. In black waters (dark, transparent waters with pH under 5) life is scarce, chiefly represented by insect larvae. Calanoida and Cyclopoida planktonic copepods found in the region were: Pseudodiaptomus gracilis, P. richar-di, Pseudodiaptomus sp., Diaptomus henseni, D. iheringi, D. jatobensis, D. coronatus, Oithona gessneri, Halicyclops venezuelaensis, Ecoto-cyclops rubescens, Tropocyclops sp., Micro-cyclops varicans, Mesocyclops brasilianus, M. longisetus. Of these Pseudodiaptomus and Oithona were only found in freshwater regions where the tide phenomenon was felt and in brackish water. The greatest abundance of Diap-tomus was observed in lakes. Mesocyclops brasilianus only occurs in nontidal waters. D. hen-seni was the dominant species of Diaptomus. Oithona gessneri was the most abundant and frequent cyclopoid. The next most frequent cyclo-poid was Microcyclops v. varicans.--Copyright 1974, Biological Abstracts, Inc.
W74-13465

RECIPROCAL INFLUENCE OF LARGE RESERVOIRS AND ADJACENT TERRITORIES IN DIFFERENT NATURAL CONDITIONS OF THE USSR,
Akademiya Nauk SSSR, Moscow. Geologicheskii Institut.
S. L. Vendrov.
Int Rev Gesamten Hydrobiol. Vol 58, No 2, p 269-272, 1973.

Descriptors: *Reservoirs, *Eutrophication, Reser-voir silting, Climate.
Identifiers: USSR.

The influences of reservoirs of various sizes and depths in different climatic regions on the climate, ground water, economy, etc. is reviewed for Soviet reservoirs. There are favorable and un-favorable results. The effects of man and other en-vironmental factors on reservoirs are also con-sidered; in particular, siltation rates, eutrophica-tion from sewage effluents, etc.--Copyright 1974, Biological Abstracts, Inc.
W74-13466

DISTRIBUTION OF THE FIDDLER CRABS, UCA PUGNAX AND UCA MINAX, IN RELA-TION TO SALINITY IN DELAWARE RIVERS,
Millersville State Coll., Pa. Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W74-13468

AN ECOLOGICAL SURVEY OF THE ALGAE OF HUNTINGTON CANYON, UTAH,
Brigham Young Univ., Provo, Utah. Dept. of Botany and Range Science.
L. E. Squires, S. R. Rushforth, and C. J. Endsley.
Brigham Young Univ Sci Bull Biol Ser. Vol 18, No 2, p 1-87, 1973. Illus.

Descriptors: *Utah, *Algae, Periphyton, Plank-ton, Nannoplankton, *Diatoms, Cyanophyta, Chrysophyta, Chara, Streams, Natural streams, Ecology.
Identifiers: Chara-vulgaris, Cladophora-glomerata, Hydrurus-foetidus, Oedogonium-sp, Mountain streams.

A quantitative and ecological study of the algae of Huntington Canyon, Emery County, Utah, was conducted from March 1971-April 1972. Net plankton, nannoplankton, periphyton, and visible attached algae were studied. Certain physical and chemical parameters in the waters of Huntington Creek and a small pond along its course were also measured. Huntington Creek contains a wide diversity of genera and species of algae. Diatoms are the main constituent of the flora of this stream throughout the year. Hydrurus foetidus is prevalent in Huntington Creek from late winter to early summer, and filamentous blue green algae abound in the summer and fall. Cladophora glomerata, Oedogonium sp. and Chara vulgaris are abundant in the creek beyond the mouth of the canyon. Most plankton in Huntington Creek originate on the substrate and in reservoirs on the left fork. Huntington Creek is a cold, fastflowing, hardwater mountain stream, and the algal flora of this creek is typical of such a habitat.--Copyright 1974, Biological Abstracts, Inc.
W74-13469

INVESTIGATIONS ON THE CATION-CONTENT IN A BOG: I. DIFFERENCES IN THE VEGETATION-COMPLEXES, (IN GERMAN),
Frankfurt Univ. (West Germany). Botanical Inst.
For primary bibliographic entry see Field 2H.
W74-13470

INVESTIGATIONS ON THE CATION-CONTENT IN A BOG: II. SEASONAL CHANGES

AND INFLUENCE OF THE SPHAGNUM VEGETATION, (IN GERMAN),
Frankfurt Univ., (West Germany). Botanical Inst.
For primary bibliographic entry see Field 2H.
W74-13471

LIMNOLOGICAL ASPECTS OF SOME MOROCCON ATLAS LAKES, WITH REFERENCE TO SOME PHYSICAL AND CHEMICAL VARIABLES, THE NATURE AND DISTRIBUTION OF THE PHYTO- AND ZOOPLANKTON, INCLUDING A NOTE ON POSSIBILITIES FOR THE DEVELOPMENT OF AN INLAND FISHERY,
Ghent Rijksuniversiteit (Belgium). Zoology Inst.
H. J. Dumont, M. Ionel, U. Dall'asta, W. Decraemer, and C. Claus.
Int Rev Gesamten Hydrobiol. Vol 58, No 1, p 33-60. 1973, Illus.

Descriptors: *Lakes, *Phytoplankton, *Zooplankton, Limnology, *Eutrophication, Water pollution effects.
Identifiers: Ifni Lake(Morocco), *Morocco.

Four mountain lakes were studied. Two are eutrophic, 1 is mesotrophic and 1 is oligotrophic. The 1st 3 have a well-developed phyto- and zooplankton, with a relatively high diversity index. There are differences between the faunas that may be ascribed to differences in surface, depth, altitude and to biological phenomena such as interspecific competition. Ifni Lake is a high-mountain lake, subject to severe environmental conditions. It has a very simple food chain; there is only 1 sp. of algae, an unicellular blue-green, 1 copepod species, 1 rotifer and 1 fish. In general, some features of definite interest for fundamental limnology were found: the presence of a pelagic Rhabdocoelid in Dayat Ifrah, some particularities in the vertical distribution of a number of plankton species and the existence of a layer of relatively warm water near the bottom of Lake Ifni. The latter is explained by a strong bottom current which flows through the lake between its phreatic in- and outlets. Stress is laid on the under-exploitation of Moroccan inland waters with respect to a freshwater fishery.--Copyright 1974, Biological Abstracts, Inc.
W74-13476

RESEARCH ON THE INFLUENCE OF HEAVY METALS ON THE DEVELOPMENT OF SCENEDESMUS QUADRICAUDA (TURP) BREB. PART I MERCURY,
Water Economics Research Inst., Wroclaw (Poland). Water Protection Research Section.
E. Rzewuska, and A. Wernikowska-Ukleja.
Polskie Archiwum Hydrobiologie, Vol 21, No 1, p 109-117, 1974. 5 fig, 11 ref.

Descriptors: *Mercury, *Toxicity, *Algae, Water quality, Heavy metals, Metals, Water pollution sources, Inhibitors, Enzymes, Proteins, Biochemistry, Photosynthesis, Plankton, Laboratory tests, Bioassay, Mortality, Lethal limit, Methodology, Growth rate, Oxygen, Analytical techniques, Primary productivity.
Identifiers: *Scenedesmus quadricauta, *Mercury ions.

In the investigations of the effect of mercury salt (Hg(NO3)2, Hg(C12) on the growth of Scenedesmus quadricauda, the increase of the quantity of organisms and intensity photosynthesis was used as a criterion of toxic effect. As the criterions adopted for evaluation did not tally with each other, an additional criterion was applied, namely the value of the coefficient obtained from the proportion of the size of assimilation processes to the respiration and decay processes in the tests with specified salt concentrations. (Katz)
W74-13477

COMPARATIVE STUDIES ON THE DETERMINATION OF TOXICITY OF SOME PESTICIDES,
Silesian Technical Univ., Gliwice (Poland). Inst. of Environmental Protection Engineering.
M. Zdybiewska, and K. Kluczycka.
Polskie Archiwum Hydrobiologi, Vol 21, No 1, p 179-190, 1974. 7 tab, 18 ref.

Descriptors: *Methodology, *Toxicity, *Pesticides, *Biochemical oxygen demand, DDT, Bioindicators, Bioassay, Testing, Herbicides, Fungicides, Analytical techniques, Mortality, Water quality, Lethal limit, Nitrification, Microorganisms, Water pollution effects, Water purification, Biological purification.
Identifiers: *Kalabina's Test, *Paramecium caudatum, *BOD, Cupritox-50, Simazine.

The toxicities of DDT, Cupritox-50 and Simazine were investigated with the parallel use of the BOD test, the mortality test and Kalabina's method. It was established that the two latter methods allow a precise determination of the toxicity of pesticides while the BOD test does not give representative results except for the limit concentration of copper ions. (Katz)
W74-13478

ERYTHROCYTE DEGENERATION IN THE ATLANTIC HERRING, CLUPEA HARENGUS HARENGUS L.,
National Marine Fisheries Service, West Boothbay Harbor, Maine. Boothbay Harbor Lab. Northeast Fisheries Center.
S. W. Sherburne.
Fishery Bulletin, Vol 71, No 1, p 125-134, January 1973. 3 tab, 8 fig, 7 ref.

Descriptors: *Herrings, *Cytological studies, *Temperature, *Fish physiology, *Fish diseases, Biology, Stress, Commercial fish, Methodology, Microscopy.
Identifiers: *Erythrocytes, Clupea harengus, Cytoplasmic inclusions, Hematocrit, Red blood cells, Blood, Cell morphology.

Cytoplasmic inclusions, associated with erythrocyte degeneration were found in the circulating blood of herring from Boothbay Harbor, Maine, and from Passamaquaddy Bay at Deer Island, N.B., Canada, in 1969. Except in one instance, when inclusions occurred in herring from water at 2 degrees C., all herring from Boothbay Harbor having inclusions were taken from seawater at 13.8 degrees or above. A relationship appears to exist between inclusion in herring erythrocytes and stress factors, especially temperature extremes. At 16 degrees C., 96% of a sample of herring were affected with inclusions, had the highest number of inclusions of all herring sampled, and had markedly different blood morphology. Inclusions were found in the Passamaquaddy Bay area in 2 of the 50 herring sampled from a seawater temperature of 9.8 degrees C., the highest temperature sampled in that area. Inclusions rarely occurred more than one to a red cell and varied in size from 1.3 to 3.9 microns. In herring containing a high incidence of inclusions, the larger inclusions were usually in the youngest red cells. Either an abnormally high percentage of up to 90% immature red cells or a low of 1 to 5% red cells generally characterized herring containing inclusions. (Katz)
W74-13479

LONG-TERM OLFACTORY 'MEMORY' IN COHO SALMON, ONCORHYNCHUS KISUTCH,
National Marine Fisheries Service, Honolulu, Hawaii. Southwest Fisheries Center.
A. E. Dizon, R. M. Horrall, and A. D. Husler.
Fishery Bulletin, Vol 71, No 1, p 315-317. January 1973. 1 tab, 12 ref.

Descriptors: *Salmon, *Anadramous fish, *Fish migration, Juvenile fish, Laboratory tests, Smolt, Life cycles, Salmonids, Fish behavior, Salinity.
Identifiers: *Coho salmon, *Oncorhynch kistuch, *Homing, *Olfactory(Memory), Impr ing, Morpholine, EEG responses.

Coho salmon smolts were exposed to a synth odoriferous substance, morpholine, for one mo and then removed from any conceivable influe of this substance for ten months. At this time th fish and controls were examined for olfactory bar EEG responses to the imprinting substance is indicated that 'memory' was dependent on posure to morpholine during one of the crit periods in the life of the fish. Fish were treate very low concentrations of morpholine, but E responses were not evident until 100 ppm reached in responsive fish. (Katz)
W74-13480

THE TOXICITY OF SOME DETERGEN TESTED ON AEDES AEGYPTI L., LEBIST RETICULATUS PETERS, A BIOMPHALARIA GLABRATA (SAY),
Royal Tropical Inst., Amsterdam (Netherlan Inst. of Tropical Hygiene; Amsterdam U (Netherlands). Lab. of Parasitology.
H. M. van Emden, C. C. M. Kroon, E. N. Schoeman, and H. A. van Seventer.
Environmental Pollution, Vol 6, No 4, p 297-3 June 1974. 2 fig, 7 tab, 9 ref.

Descriptors: *Toxicity, *Detergents, *Anio *Mosquitos, *Snails, Surfactants, Biodegradati Aquatic life, Larvae, Bioassay, Mode of act Alkylbenzene, Sulfonates, Lethal limit.
Identifiers: *Guppies, *Aedes aegypti, *Lebi reticulatus, *Non-ionic detergents, Biomphal glabrata, Gills.

Toxicities of different concentrations of anio and non-ionic commercial detergents biodegradation products of these detergents w tested on a mosquito, Aedes aegypti, the gup Lebistes reticulatus, and the snail, Biomphal glabrata. The mosquito larvae were more sensi to anionic than non-ionic detergents. The mod action of the detergents was determined as was most sensitive stage of development. Lebi reticulatus showed irreversible damage of epithelium of the gills by anionic, as well as chained non-ionics, and a reversible paralyzing fect with short (and branched) non-ionic de gents. The snail was equally susceptible to types of detergents. Biodegradation products 1000 ppm detergent had no influence on the tality of the three tested animals. (Katz)
W74-13481

OLFACTORY RESPONSE A FENITROTHION TOXICITY IN AMERIC LOBSTERS (HOMARUS AMERICANUS),
Fisheries Research Board of Canada, St. Andr (New Brunswick). Biological Station.
D. W. McLeese.
Journal of the Fisheries Research Board Canada, Vol 31, No 6, p 1127-1131, June 197 tab, 2 fig, 14 ref.

Descriptors: *Lobsters, *Toxicity, *Pesticid Commercial shellfish, Invertebrates, ganophosphorous pesticides, Bioassay, Lar Methodology, Lethal limit.
Identifiers: *Homarus americanus, *Olfact response, *Fenitrothion, *Chemo recept LC50, LT50.

In test runways, the olfactory response of An ican lobsters (Homarus americanus) to cod mu extract is not affected by simultaneous prese tion of fenitrothion at measured concentrati ranging from 0.05 to 25.4 ppb at time of stim tion. Larval and adult lobsters have similar sitivity to fenitrothion. For both, the 96-hour L is about 1ppb. The lethal threshold for larva about 0.015ppb, that for adults is 0.3 ppb or lo (Katz)
W74-13483

HRONIC TOXICITY OF NICKEL TO THE ATHEAD MINNOW,
lational Water Quality Lab., Cincinnati, Ohio.
lewtown Fish Toxicology Lab.
. H. Pickering.
ournal Water Pollution Control Federation, Vol 6, No 4, p 760-765, April 1974. 5 tab, 21 ref.

escriptors: *Nickel, *Bioassay, *Toxicity, Standards, Minnows, Bioindicators, Resistance, rowth rate, Reproduction, Water quality control, pawning, Heavy metals, Hydrogen ion concenation, Laboratory tests, Methodology.
lentifiers: *MATC, *TL50, Pimephales romelas, Chronic bioassays.

he chronic toxicity of nickel to fathead minnows as determined and acute toxicity data for use in alculating an application factor was obtained. The riteria for toxicity were the effects on survival, rowth, and reproduction. The application factor as estimated by using the maximum acceptable oxicant concentration (MATC) of the chronic test nd the 96 hr TL50 of the acute toxicity bioassay. ata indicate that nickel concentrations of 0.38 g/l and lower do not adversely affect survival, rowth and reproduction of the fathead minnow nd concentrations of 0.73 mg/l caused a signifiant reduction on both the number of eggs per pawning and the hatchability of these eggs. (Katz)
74-13485

MMONIA TOXICITY LEVELS AND NITRATE OLERANCE OF CHANNEL CATFISH,
aterpillar Tractor Co., Peoria, Ill.
. L. Knepp, and G. F. Arkin.
he Progressive Fish-Culturist, Vol 35, No 4, p 21-224, October 1973. 2 fig, 5 ref.

escriptors: *Channel catfish, *Ammonia, Toxicity, *Bass, *Nitrates, *Fish farming, Resistance, Water pollution sources, Commercial sh, Fish management, Lethal limit, Bioassay, ilters, Filtration, Water purification, Water quali, Behavior, Fish toxins.
lentifiers: *Ictalurus puctatus, *Micropterus salioides, LC50.

mmonia toxicity levels and nitrate tolerance are nportant factors in effective channel catfish arming. The results of this investigation indicate at the LC100 value for total ammonia is 45.7 and e LC50 is 37.5ppm. Observations of nitrate conentrations for channel catfish and large mouth ass (Micropterus salmoides) indicate tolerance as igh as 400 ppm. First symptom levels, such as the oncentration values of total ammonia when fish o off feed (30 ppm) are seemingly more important closed-system fish farmers. Recovery from igher levels than this indicate tolerance for short eriods of time. (Katz)
74-13486

CRITICAL STUDY OF METHODS IN NUERICAL TAXONOMY: THE CLASSIFICAION OF AQUATIC BACTERIA, (IN FRENCH),
. Delabre, A. Bianchi, and M. Veron.
nn Microbiol (Paris). Vol 124, No 4, p 489-506. 973, Illus. English summary.

escriptors: *Aquatic bacteria, *Systematics, lassification.

he present work compares 4 methods of ierarchical classification as applied to 135 aerobic eterotrophic aquatic bacteria: 98 strains chosen random from among 440 marine strains, 12 hosen from among 40 isolated from alpine torents, and 25 reference strains obtained from everal collections. The reference strains belonged 18 different species. For each strain, 215 henotypic characters were determined, of which 46 were related to nutritional versatility towards 46 C substrates. For each pair of strains, the milarity was calculated by means of the simple atching coefficient, and then converted into a distance coefficient. From these data, a classification was established by 4 methods: aggregation according to minimal jump, aggregation according to minimal diameter, aggregation according to average distance, and aggregation according to variance. For the delimitation of the phenons, the maximum level of distance was chosen according to a defined criterion. In the classifications 1, 2, 3 and 4, the number of the phenons was 20, 16, 41 and 29, respectively. The 4 classifications were judged on their respective merits by the determination of coefficients of likelihood (average phenetic coefficient, intraphenetic or residual heterogeneity) and of discriminant power (interphenetic heterogeneity). Because the 2 coefficients of heterogeneity were the most accurate and useful, the classification method by aggregation according to variance is recommended.--Copyright 1974, Biological Abstracts, Inc.
W74-13487

MERCURY CONTENT OF THE MUSSELS (MYTILUS EDULIS) GROWING FREE AND UNDER CULTIVATION IN NORTHWEST SPAIN, (IN SPANISH),
Instituto de Investigaciones Pesqueras, Cadiz (Spain). Laboratorio de Investigaciones Pesqueras.
For primary bibliographic entry see Field 5B.
W74-13493

ALGAL ASSAYS OF ARCHIPELAGO WATERS: QUANTITATIVE ASPECTS,
Lantbrukshogskolan, Uppsala (Sweden). Institutionen for Vaxtfysiologi.
L. Bjorn, P. E. Melin, and K. E. Roland.
Oikos, Vol 24, No 2, p 171-178, 1973, Illus.

Descriptors: *Algae, Harvesting, *Bioassay.
Identifiers: Aphanizomenon, Oscillatoria, *Stockholm Archipelago, *Sweden.

Eighteen surface water samples were collected during 1970 from Lake Malaren (freshwater) and to the outer part of the Stockholm Archipelago (brackish water). After filtration most samples were enriched with phosphate (P), nitrate (N) and chelated trace elements (TE), alone or in combination, and inoculated with blue-green algae, Oscillatoria Agardhii or Aphanizomenon flos-aquea, isolated from the investigated area. The algae (not free from bacteria) were cultivated under standard conditions. The dry weight at harvesting was used to evaluate the growth-stimulating effect (in comparison with unenriched controls) of the additions. The yields of O. Agardhii (the controls and those with all 3 additions) were largest 17-26 km to the east of Slussen, the Stockholm lock. During the year the smallest growth occurred during summer. The results with A. flos-aquae followed a similar distribution pattern. Regression analysis of the results with O. Agardhii showed that enrichment with TE or P, alone or together, did not stimulate growth. The addition of N, alone and in combinations with TE or P, stimulated the growth, in proportion to the growth in the unenriched water samples. The enrichment with P + N + TE gave the largest stimulation.--Copyright 1974, Biological Abstracts, Inc.
W74-13495

POTENTIAL PRODUCTIVITY OF AN ALPINE LAKE AS INDICATED BY REMOVAL AND REINTRODUCTION OF FISH,
British Columbia Univ., Vancouver. Inst. of Fisheries.
C. J. Walters, and R. E. Vincent.
Trans Am Fish Soc. Vol 102, No 4, p 675-697, 1973. Illus.

Descriptors: *Zooplankton, *Fish food organisms, Brook trout, *Colorado, *Productivity, Entrophication.
Identifiers: *Emmaline Lake(Colo).

Invertebrate population changes were traced during 1966-1968 in Emmalins Lake, Colorado, after removal in 1964 of a population of stunted brook trout. Species composition of the zooplankton changed greatly after fish removal; in the absence of fish predation, large species were dominant. Populations of mud dwelling midges increased after fish removal; in the absence of fish predation, population regulation appeared to occur through densitydependent larval mortality. Insect emergency over rocky areas was highest in the 2nd summer after fish removal, following increases in periphyton production. In 1968, the lake was restocked with yearling cutthroat trout that fed primarily on midge pupae and Daphnia middendorffiana, and doubled in weight during the 1st summer in the lake. Growth efficiency of the trout was about 10-30%. Less than half of the daily ration was present in trout stomachs at any time, as judged from observed growth rate and potential growth efficiency. A computer stimulation model of the fish production system suggested that yield and optimum management policy (stocking rate and harvest rate) are most strongly affected by the quantities of terrestrial insects available to fish. Optimum stocking rate is apprently much lower than that which would maximize total invertebrate yield to fish.--Copyright 1974, Biological Abstracts, Inc.
W74-13496

5D. Waste Treatment Processes

ECONOMICS OF INDUSTRIAL WASTE WATER SAMPLING,
N-CON Systems Co., Inc., New Rochelle, N.Y.
M. I. Beach, and J. S. Beach, Jr.
Water and Sewage Works, Reference Number, p R68-R74, April 30, 1974. 7 fig.

Descriptors: *Industrial wastes, *Sampling, *Waste identification, Testing procedures, Waste water treatment, Methodology.

Increased water quality standards and rising waste water treatment costs, make it imperative that firms be continually aware of the quality and quantity of their effluent. A variety of sampling process designs to provide such information are assessed. The initial stage in determining any sampling design is the choice of the optimal sampling site. Such a site should provide access to all pertinent effluent streams, while avoiding waste water streams which might contribute to dilution or otherwise interfere with the analysis. Often such areas are inaccessible requiring samples to be taken from many sites to derive a reasonable approximation of the actual effluent quality. Six sampling approaches characterized by their collection methods may be selected: (1) individual or grab sampling; (2) simple composite sampling; (3) sequential composite sampling; (4) continuous sampling; (5) hand proportioned composite sampling; and (6) automatically proportional composite sampling. An evaluation of each indicates that appropriate sampling techniques depend on the waste water quantity and quality and release times. Appropriate sampling equipment depends on site selection and sampling technique chosen. Several sampler pumps, cup and bucket elevator, scoops and vaccuums, are evaluated. Addition of recording and alarm devices is also discussed. (Schroeder-Wisconsin)
W74-12780

BENEFIT COST ANALYSIS OF ALTERNATIVE EXPANSION SITES FOR THE VIRGINIA KEY SEWAGE TREATMENT PLANT,
Miami Univ., Fla. Sea Grant Program.
L. G. Anderson.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10188, $3.25 in paper copy, $2.25 in microfiche. Sea Grant Special Bulletin No 11, January 1973. 21 p, 1 fig, 2 tab, 2 ref. NOAA 2-35147.

Descriptors: *Land use, *Cost-benefit analysis, *Sewage treatment, *Facilities, Florida, Recreation facilities, Cost comparison, Discount rates, Camp sites, Land development, Beaches.
Identifiers: *Opportunity cost, Virginia Key(Fla), Dade County(Fla).

The cost effectiveness of two sites considered for expansion of Miami's Virginia Key sewage treatment plant is reviewed. The first alternative considered is a southern site that is a marshy former solid waste disposal dump. Construction cost there will be $21 million. A second site, located to the north, is more suitable for construction as well as for conversion to a recreational facility. Expansion of the sewage plant here would nearly destroy this site for water recreation use. Construction costs at this site would be about $20 million. Another site cost is the opportunity cost of land. Opportunity costs here represent the value of two recreational activities which must be foregone with the plant's extension: overnight camping and day picknicking. The net present value of benefits from each activity is evaluated under alternative discount rates for each site. In general, a comparison of results indicates that the net present value of benefits that could be generated from maintaining the north site for recreational development exceed the $1 million construction cost saving were the treatment plant extended into this area. (Schroeder-Wisconsin)
W74-12785

CHEMICAL WASTES: WHAT'S AHEAD.
Water and Wastes Engineering, Vol 9, No 5, p C4-C7, 1972. 8 tab.

Descriptors: *Chemical industry, *Waste water treatment, *Costs, Industrial wastes, Chemical wastes, Capital costs, Operating costs, Organic compounds, Inorganic compounds.
Identifiers: Inorganic chemicals industry, Organic chemicals industry.

Waste water discharge and treatment parameters are presented for the inorganic and organic chemicals industries. Contaminated waste water from the inorganic industry comes primarily from electrolysis and crystalization brines, washings from filter cakes, spend acid and alkalies, and washings from raw materials. Treatment practices vary but generally involve in-plant segragation of contaminated and uncontaminated cooling waters. Equalization, neutralization, sedimentation and lagooning processes are widely used. Average capital costs were estimated at $2,223/1000 gpd or $3.74/annual ton of production; average operating costs were estimated at $58.49/1000 gpd or $0.98 per yr/annual ton of production. Waste treatment data from 53 organic chemical plants is also summarized. Principal waste water contaminants in the organic industry effluents include BOD, COD, oil, suspended solids, acidity, heavy metals, color, taste and odor producing compounds, and residual organic products and by-products. Capital and operating costs to treat organic industrial waste water are estimated for six treatment levels over the 1969-1973 period. (Schroeder-Wisconsin)
W74-12790

APPARATUS FOR FLUID TREATMENT,
Sybron Corp., Rochester, N.Y. (assignee).
W. J. Maroney.
US Patent No 3,812,969, 4 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 922, No 4, p 1137, May 28, 1974.

Descriptors: *Patents, *Ion exchange, *Resins, *Filtration, Water treatment, *Waste water treatment, Pollution abatement, Equipment.
Identifiers: Compressed air.

The apparatus includes an outer vessel having a closed bottom and an inner vessel having an open bottom. There is an opening between the inner vessel and the bottom of the outer vessel. The bed of solid particles is supported by the bottom of the outer vessel and extends up into at least one of the vessels. The bed covers the opening between the inner vessel and the bottom of the outer vessel. An inlet conduit admits fluid to one of the vessels and the fluid passes down through the bed and through the opening into the other vessel. Since the bed is supported by the outer vessel, support paraphernalia such as underdrains and strainers are not required. At least one of the vessels has a closed top. Fluid accumulates in the vessel and a pocket of air is trapped above the accumulated fluid and is thus compressed. The bed is backwashed by reducing pressure on the inlet side of the bed, whereby the compressed air forces the accumulated fluid back through the bed and through a backwash outlet conduit. During the backwash cycle, air may be withdrawn from the pocket of compressed air and injected into the bed, so that a mixture of air and fluid will pass through the bed and scour the particles. (Sinha-OEIS)
W74-12799

AERATOR HEAD,
Saratoga Development Corp., San Diego, Calif. (assignee).
R. C. Sabins.
US Patent No 3,819,160, 3 p, 5 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 923, No 4, p 1405, June 25, 1974.

Descriptors: *Patents, *Aeration, *Water treatment, *Waste water treatment, Mixing, Equipment.

The aerator head is capable of operation over a wide range of flow rates to provide effective aeration of a large volume of water by a turbulent mixing action. The same configuration can be used for gentle mixing in an aquarium, or for violent mixing in a water treatment system containing solids in suspension, such as sand. The head is a block with connections to an air supply. The block contains ducts which lead to a pair of orifices facing each other across a gap or slot. The two streams of air ejected from the orifices impinge in the slot and spread in all directions in a turbulent manner. The extent of the turbulence depends on the flow rate of air, but even at a low flow rate, the air is distributed through a considerable volume of water. (Sinha-OEIS)
W74-12800

APPARATUS FOR AUTOMATICALLY EFFECTING VACUUM CONCENTRATION AND RECOVERY OF WASTE LIQUID,
K. Takayasu.
US Patent No 3,826,718, 5 p, 4 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 924, No 5, p 1303, July 30, 1974.

Descriptors: *Patents, *Waste water treatment, Pollution abatement, *Distillation, *Water quality control, *Water pollution control, *Condensation, Evaporation, Equipment, Liquid wastes, Metals.
Identifiers: Vacuum concentration.

An evaporating vessel which is provided with a steam riser tube on its top is occupied by a vapor separator and a condenser. The condenser is subjected, through a drain tank consisting of two tanks connected in series, to vacuum. A waste liquid is supplied into the evaporating vessel and is heated by a steam heater. Steam thus produced is condensed into distilled water by the condenser and the distilled water is discharged through the drain tank to the outside. The liquid level in the evaporating vessel, water level in the drain tank and liquid level in the waste liquid recovery tank are controlled by relays arranged on a control board in a manner such that the evaporating and concentrating operations of the waste liquid and discharge of distilled water are automatically repeated for a given number of times. (Sinha-OEIS)
W74-12802

BREAKING OF OIL-IN-WATER EMULSIONS,
J. W. Schick, and D. R. Cushman.
US Patent No 3,826,725, 2 p, 1 tab, 3 ref; Offici
Gazette of the United States Patent Office, V
924, No 5, p 1304, July 30, 1974.

Descriptors: *Patents, *Oily water, *Emulsion
*Flocculation, Pollution abatement, *Waste wat
treatment, Water quality control, Water pollutic
control, Electrolytes, Hydrogen ion concentr
tion.
Identifiers: Electric current, Aluminum hydro
ide.

This method comprises adjusting the emulsi
with an electrolyte to a pH not higher than about
Through the thus-adjusted emulsion, there
transmitted direct electric current in order to o
tain a pH of at least about 5, whereby the emulsi
is resolved into a water phase and an oil phas
The mechanism involved in the emulsion breaki
procedure is dependent on the formulation of al
minum hydroxide as a floc. As the hydroxi
forms first as a colloidal suspension,
preferentially adsorbs onto the surface. This flo
preferential adsorption phenomenon appears d
pendent on solution pH. As the pH approaches t
critical point of 5, the aluminum hydroxide collo
particles agglomerate into a visible floc and sett
out. When this occurs, the major portion of the
particles are adsorbed leaving a relatively oil-fr
water phase. (Sinha-OEIS)
W74-12803

**METHOD FOR THE DISPOSAL OF CON
BUSTIBLE AND DILUTE AQUEOUS WASTES,**
Atomic Energy Commission, Washington, D.
(assignee).
E. S. Grimmett, and P. E. Lamont.
US Patent No 3,827,946, 2 p, 1 fig, 6 ref; Offici
Gazette of the United States Patent Office, V
925, No 1, p 233, August 6, 1974.

Descriptors: *Patents, *Pollution abatemer
*Evaporation, *Condensation, *Steam, Potab
water, Liquid wastes, Equipment.
Identifiers: *Power production.

Fluidized-bed techniques are employed to dispo
of combustible waste materials and dilute aqueo
wastes and simultaneously produce useful pow
and potable water. Combustible trash plus a
necessary conventional fuel is burned in
fluidized-bed burner which is used to genera
steam. The steam thus produced is used
evaporate dilute aqueous wastes in the first sta
of a fluidized-bed evaporator. The steam produc
in the first stage is used to evaporate dilute aqu
ous wastes in the second stage of a fluidized-b
evaporator. The steam produced in the seco
stage is used to generate power and the spe
steam from both stages of fluidized-bed evapor
tion is condensed as potable water. (Sinha-OEIS)
W74-12805

PLANT FOR WASTE WATER TREATMENT,
FMC Corp., Chicago, Ill. (assignee).
Q. L. Hampton, and E. J. Matras.
US Patent No 3,828,933, 6 p, 7 fig, 2 ref; Offici
Gazette of the United States Patent Office, V
925, No 2, p 495, August 13, 1974.

Descriptors: *Patents, *Waste water treatmer
*Aeration, *Digestion tanks, Pollution abatemer
Water pollution control, Water quality contr
*Treatment facilities.
Identifiers: Settling tanks.

Apparatus for converting a unitary liquid holdi
tank into a series of interconnected cooperati
zones, including aeration and settling zones, f
activated sludge type processing of wastewat
comprises a self supporting insertable modular s
tling tank filling only a portion of the total area
the holding tank. The modular settling tank h
downward and inward extending sloping walls

lower portion to form an accumulation area for settled sludge. Isolated liquid tight hollow comtments have closable ports communicating with interior of the compartments. Gas dispersion ans are supported by and positioned adjacent exterior of the modular tank. First and second ughs are mounted within the modular tank for eiving sludge and a clarified liquid respectively e discharged from the modular settling tank. trough receives sludge which is delivered by movable suspension exhaust and directs at t a part of it to the second cross-sectional segnt of the holding tank. (Sinha-OEIS)
4-12806

VICE FOR REMOVING FLOATED MATERIIN FLOTATION PROCESSES,
gremont Societe Generale d'Epuration et ssainissement, Rueil-Malmaison (France). ignee).
. Rovel.
Patent No 3,828,935, 4 p, 5 fig, 4 ref; Official zette of the United States Patent Office, Vol , No 2, p 495, August 13, 1974.

scriptors: *Patents, *Flotation, Pollution abatent, *Waste water treatment, Water quality con, Water pollution control, Equipment, paration techniques.

evice is described for removing floated materifrom a body of liquid. It comprises a tank, a lage, and a sloping overflow spout. A collector nounted in the immediate proximity of the er surface of the grillage. The upper portion of floated material is moved into the overflow ut. A screw conveyor moves the floated erial along the overflow spout to the outlet. ha-OEIS)
4-12807

DUCTION OF WATER POLLUTION BY OLOGICAL DENITRIFICATION,
on Oil Co. of California, Los Angeles, Calif. ignee).
Iashimoto.
Patent No 3,829,377, 5 p, 1 fig, 6 ref; Official zette of the United States Patent Office, Vol , No 2, p 604, August 13, 1974.

scriptors: *Patents, Water purification, *Waste er treatment, *Denitrification, *Irrigation er, Methane, Drainage water, *Anaerobic conons, Pollution abatement, Water quality con, Water pollution control, Equipment, Biologitreatment.

in water from an irrigation system is held in a rage tank and transported to a holding tank ch has a special packing to increase its availasurface area. Drain water and methane gas are oduced into the bottom of the holding tank. rain water gradually rises within the holding k and denitrification of the nitrate ion proceeds he water rises. A major portion of the nitrates converted to nitrogen gas which partly disves in the water. Anaerobic conditions exist in denitrification step since an oxygen-free vapor resent above the water undergoing treatment. circulation of the hydrocarbon gas also eeps any oxygen which may be present in the d water from the treatment step. (Sinha-OEIS)
4-12808

YGEN-HYDROGEN GENERATION AND WAGE TREATMENT METHOD AND STEM,
B. Wesley.
Patent No 3,829,368, 7 p, 1 fig, 2 ref; Official zette of the United States Patent Office, Vol , No 2, p 602, August 13, 1974.

scriptors: *Patents, *Sewage treatment, *Waste ter treatment, Pollution abatement, Water polon control, Water quality control, Electrolysis, table water, Energy.

Identifiers: Kinetic energy, Electrical energy, Fuel cells.

A method for the regenerative treatment of sewage reaction and energy recovery comprises the following steps: pretreating the sewage to remove the majority of the solid portions; decomposing pretreated sewage into constituent gaseous elements under elevated pressure; collecting the pressurized constituent gaseous elements; converting the potential energy of the pressurized gaseous elements to kinetic energy by expanding and depressurizing gaseous elements; generating electrical energy from kinetic energy; chemically recombining the depressurized constituent elements and obtaining electrical energy and water; recycling the electrical energy to decompose additional sewage; and supplying supplemental electrical energy needed for the continuous decomposition of additional sewage. (Sinha-OEIS)
W74-12809

METHOD OF TREATING WASTE SOLUTION CONTAINING CHROMATE ION OR CYANIDE ION,
Nihon Filter Co. Ltd., Tokyo (Japan). (assignee).
T. Nakamura.
US Patent No 3,826,741, 6 p, 7 fig, 2 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 924, No 5, p 1307, July 30, 1974.

Descriptors: *Patents, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, Metals, Hydrogen ion concentration.
Identifiers: Chromate ions, Cyanide ions, Redox potentiometers, Redox potential, *Chemical treatment.

A method of treating a waste solution containing chromate ion or cyanide ion is disclosed in which a redox potentiometer with a pH correction circuit is used for the detection of the redox potential and the pH electromotive force of the waste solution being treated. The output voltages are superposed with the pH correction circuit so that the variation of redox potential caused by the variation of pH value of the waste solution is compensated. A corrected output voltage which indicates the redox potential corresponding to a pre-set pH value of the waste solution is generated. The amount of treating chemicals being fed into the treatment ank is adjusted, by a flow regulator which is controlled in response to the corrected output voltage delivered from the pH correction circuit. (Sinha-OEIS)
W74-12810

ANALYSIS OF WATER CHARACTERISTICS OF MANUFACTURING INDUSTRIES AND THEIR ADAPTABILITY TO SEMI-ARID REGIONS,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 3E.
W74-12863

TREATMENT OF LIQUID WASTES FROM CANE SUGAR INDUSTRY,
Puerto Rico Univ., Mayaguez. Dept. of Chemical Engineering.
R. M. Candelario.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 292, $5.25 in paper copy, $2.25 in microfiche. Puerto Rico Water Resources Research Institute, Mayaguez, Completion Report, June 1974. 103 p, 36 fig, 14 tab, 37 ref. OWRT A-033-PR(1).

Descriptors: *Puerto Rico, Pilot plants, Waste identification, *Waste water treatment, *Industrial wastes, *Sugarcane, Liquid wastes, *Activated sludge, Filtration, *Trickling filters, Aeration, Activated carbon, Anaerobic digestion.

The applicability of several waste treatment processes to the purification of the waste waters generated by the cane sugar industry in Puerto Rico was studied. The specific processes considered were anaerobic digestion, activated sludge treatment, trickling filtration, oxidation using mechanically supplied air, and adsorption in activated charcoal. Pilot plant units which allowed determining the changes in efficiency brought about by changes in the variables of operation were constructed for each of the processes considered. Numerous runs were made in each of them using as raw material waste waters brought into the laboratory from different sugar mills operating in the Western part of Puerto Rico. As a first step in the study the physical and chemical parameters characterizing the wastes were evaluated. The actual volumes of effluents discharged by the mills were also determined. The results obtained show that cane sugar waste waters are amenable to treatment by each of the processes considered. In each of them efficiencies of the same order of magnitude as those corresponding to the industrial application of the same processes to other wastes were obtained. The reductions in pollution load attained were in the order of 50% for anaerobic digestion, 80% for activated sludge treatment, 75% for trickling filtration, 50% for mechanical aeration methods, and 50% for treatment with activated charcoal. Correlations were made which allow estimating the efficiency of each of these processes as a function of physical parameters of operation. The pollutional load of waste waters from the cane sugar industry may therefore be significantly reduced by using the treatment processes evaluated in this study.
W74-12865

CONFERENCE ON RECYCLING TREATED MUNICIPAL WASTEWATER THROUGH FOREST AND CROPLAND.
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-003, $1.20; microfiche from NTIS, Springfield, Va 22161 as PB-236 313, $2.25 in microfiche. Environmental Protection Agency, Technology Series, Report EPA-660/2-74-003, March 1974. 463 p. William E Sopper and Louis T Kardos (eds). EPA Project R-800678, Program Element 1BB045.

Descriptors: *Waste water disposal, Pollution abatement, *Waste water treatment, *Tertiary treatment, *Conferences, *Crop response, *Groundwater recharge, *Soil-water-plant relationships, *Municipal wastes, Cycling nutrients, Agronomic crops, Forests, Sprinkler irrigation, Environmental effects, Land use, Design data, Pathogenic bacteria, Costs, *Water reuse.
Identifiers: *Waste water reuse, *Waste water irrigation.

Intense interest in preserving the quality of the environment has reactivated interest in the management of wastewaters by applying them to the land. Use of land application approaches for wastewater management must be updated to conform to new concepts of conserving and protecting the quality of land and water resources. Design and operation of land-based wastewater management systems is dependent on site selection, the degree of water renovation desired, and the planned use of the site as well as the basic physical, chemical, and biochemical processes which influence system performance. The 32 individual papers included in this report are presented in sections which cover municipal wastewater characteristics, the function of the soil in the treatment process, vegetation responses, system design and cost, examples of operating systems, and the status of guidelines for land disposal of wastewater. (See W74-12870 thru W74-12901) (EPA)
W74-12869

CHEMICAL AND BIOLOGICAL QUALITY OF SEWAGE EFFLUENTS,
Rutgers-the State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
J. V. Hunter, and T. A. Kotalik.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 6-27. 14 tab, 70 ref.

Descriptors: *Waste water treatment, *Sewage, *Effluents, *Water quality, Microorganisms, Chlorination, Public health, Biological properties, Chemical properties.
Identifiers: *Effluent composition.

The chemical and biological composition of effluents reflects the quality of the waste water entering the plant and the changes that occur during the physical, chemical, and biological processes in the plant. The chemical changes that occur during treatment reflect the biological removal of 80-90 percent of the organic matter and the production of more oxidized organics. Interest in the removal of microorganisms during treatment lies mainly in the area involving the efficiency of pathogen removal. In addition to waste water bacteria, viruses that have persisted through the plant, large numbers of protozoa and nematodes can be developed during biological treatment. Interest here has centered on the nematodes which can ingest pathogens and thus have public health significance. Effluent chlorination is largely for disinfection; however, actual practice may not always achieve this end. Excessive chlorination without dechlorination may lead to toxicity problems in receiving waters. (See also W74-12869) (Sandoski-FIRL)
W74-12870

CHEMICAL AND BIOLOGICAL QUALITY OF MUNICIPAL SLUDGE,
Metropolitan Sanitary District of Greater Chicago, Ill.
J. R. Peterson, C. Lue-Hing, and D. R. Zenz.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 28-39. 3 tab, 16 ref.

Descriptors: *Sewage sludge, *Municipal wastes, *Waste water treatment, Chemical properties, Biological properties, *Sludge treatment, Treatment facilities, Methodology, *Water quality.

Sewage sludge is derived from the organic and inorganic matter removed from waste water at sewage treatment plants. The nature of sludges depends on the waste water sources and the method of waste water treatment. If waste solids are to be evaluated as a soil amendment or as a fertilizer, it is important to understand their chemical and biological properties. A comparison of sludge analyses from various treatment plants would be confounded by the individual treatment processes; therefore, some of the more common waste water treatment methods are described. (See also W74-12869) (Sandoski-FIRL)
W74-12871

THE SOIL AS A PHYSICAL FILTER,
Robert S. Kerr Water Research Center, Ada, Okla.
R. E. Thomas.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 40-46. 10 ref.

Descriptors: *Filters, *Soil amendments, *Soil analysis, Soil physical properties, *Waste water disposal, Soil disposal fields, Soil types, Suspended solids, Filtration, *Waste water treatment, Water reuse.

Soil is a mixture of mineral particles, organic material, air, and water. The pore space occupied by air or water may be as much as 50 percent of the total volume, and the pathway of movement through these pores is a maze of varying sized channels. It is the size distribution and the nature of this maze which controls the capability of the soil to filter out suspended solids that are found in treatment plant effluents or industrial waste waters. Several approaches to utilize this filtering capability of the soil for disposal or renovation of municipal effluents and industrial waste waters include septic tank-soil absorption systems, cropland irrigation systems, surface disposal systems, and groundwater recharge systems. Clogging of the filter and management practices which can be used to extend the life of the filter are discussed. (See also W74-12869) (Sandoski-FIRL)
W74-12872

THE SOIL AS A CHEMICAL FILTER,
Michigan State Univ., Lansing. Dept. of Crop and Soil Sciences.
B. G. Ellis.

Descriptors: *Filters, *Soil chemistry, *Ion exchange, *Adsorption, *Chemical precipitation, Soil chemical properties, Waste water disposal, Filtration, *Waste water treatment, Water reuse.

The areas of soil chemistry which are of most importance for the soil to act as a chemical filter are: ion exchange, adsorption and precipitation, and chemical alteration. This discussion includes the theory of each process and the importance of each process to waste disposal systems. (See also W74-12869) (Sandoski-FIRL)
W74-12873

THE SOIL AS A BIOLOGICAL FILTER,
Ohio State Univ., Columbus. Dept. of Agronomy.
R. H. Miller.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 73-94. 3 tab, 58 ref.

Descriptors: *Filters, *Soil bacteria, Municipal wastes, *Waste water disposal, Nitrification, Soil disposal fields, Application techniques, Aeration, *Waste water treatment, Filtration, Water reuse.

The groups of organisms comprising the soil biological filter are bacteria actinomycete, fungi, protozoa, algae, soil micro- and macro-animals, and higher plants. The various microbial reactions which influence the success of soil as a filter for renovating municipal waste water and sludge are reviewed. The majority of these activities are beneficial for maintaining the integrity and effectiveness of the soil filter. Only one reaction, nitrification, can be considered detrimental to the success of the soil filter when the disposal method maintains adequate soil aeration. Also, it should be emphasized that prolonged periods of anaerobiosis must be avoided for the proper functions of the microbial component of the soil filter. Finally, proper management of land disposal systems for liquid waste regardless of the mode of application must provide for periods of adequate aeration. (See also W74-12869) (Sandoski-FIRL)
W74-12874

SITE SELECTION CRITERIA FOR WASTEWATER DISPOSAL -- SOILS AND HYDROGEOLOGIC CONSIDERATIONS,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
R. R. Parizek.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 95-130. 5 tab, 48 ref.

Descriptors: *Sites, *Irrigation systems, So
Geology, Hydrology, Topography, Proje
planning, *Waste water treatment, Recycling, E
vironmental control, *Waste water disposa
*Water reuse.
Identifiers: *Spray irrigation.

Site selection criteria for sewage effluent spray
rigation sites are discussed. Soils, geolog
hydrology, topography, project management, a
other factors are considered to maximize t
chances for achieving a high degree of renovati
of waste constituents while at the same tir
minimizing secondary environmental proble
that can result. Site conditions suitable and u
suitable for groundwater recharge and reuse a
pointed out as are factors to be considered wh
designing monitoring programs necessary to pro
the degree of treatment being achieved. Finall
the importance of the hydrogeologic-soil conditi
is discussed for the benefit of administrators wh
are responsible for defining environment
procedures to be used for waste water irrigati
projects. (See also W74-12869) (Sandoski-FIRL)
W74-12875

**RENOVATION OF MUNICIPAL WAST
WATER THROUGH LAND DISPOSAL E
SPRAY IRRIGATION,**
Pennsylvania State Univ., University Park. Dep
of Agronomy.
L. T. Kardos, and W. E. Sopper.
In: Conference on Recycling Treated Municip
Wastewater Through Forest and Cropland, Augu
21-24, 1972, The Pennsylvania State Universit
University Park, p 131-145. 8 tab, 3 ref.

Descriptors: *Soil disposal fields, *Irrigati
systems, Data collections, Evaluation, Was
water disposal, *Waste water treatment, Groun
water recharge, Potable water, *Water reuse.
Identifiers: *Spray irrigation.

In a Penn State project soil solution samples we
extracted with suction lysimeters installed at va
ous depths in the soil profile. The chemical quali
of the chlorinated secondary treated waste wat
was monitored by obtaining a composite of th
waste water being applied through the sprinkle
during each irrigation sequence. Average annu
concentrations of various constituents in the a
plied waste water are shown for the corn rotati
area for 1963-1970 and are representative of th
concentrations in waste water applied to the oth
areas. The extent of renovation of the appli
waste water may be expressed as the change
mean annual concentration of a particular co
stituent in the applied waste water when compare
with that found in the soil solution in the suctio
lysimeters. The data allow one to conclude th
with appropriate management of nitrogen loads
maximize utilization by the vegetation and wi
hydraulic loads adjusted to the soil site to ma
imize denitrification it should be possible
recharge water of drinking water quality into th
aquifer below a waste water disposal site. (Se
also W74-12869) (Sandoski-FIRL)
W74-12876

**RENOVATING SECONDARY EFFLUENT B
GROUNDWATER RECHARGE WITH INFIL
TRATION BASINS,**
Agriculture Research Service, Phoenix, Ari
Water Conservation Lab.
H. Bouwer.
In: Conference on Recycling Treated Municip
Wastewater Through Forest and Cropland, Augu
21-24, 1972, The Pennsylvania State Universit
University Park, p 146-156. 1 tab, 10 ref.

Descriptors: *Groundwater recharge, *F
recharge, Data collections, *Design criteri
*Arizona, Performance, Infiltration, *Waste wat
treatment, Tertiary treatment, *Water reuse.
Identifiers: *Salt River Valley(Ariz), *Infiltratio
basins.

e Salt River Valley in Central Arizona is chang- from a predominantly agricultural to a edominantly urban valley. Groundwater cur- ntly supplies about one-third of the municipal d agricultural water needs in the area of the Salt ver Project. The resulting depletion of the oundwater can be reduced if the sewage effluent oduced by the increasing population can be sed. Unrestricted use of sewage effluent for reational lakes and irrigation requires tertiary atment. A promising technique for such treat- nt in the Salt River Valley would be by ground- ter recharge with spreading basins in the Salt ver bed. Because the performance of a land-fil- tion system depends so much on the local con- ions of climate, soil, and groundwater, a pilot stem, called the Flushing Meadows Project, was talled in 1967. The findings obtained and their e in the design of a large-scale system are sented. (See also W74-12869) (Sandoski-FIRL)
74-12877

OSPHORUS AND NITRATE LEVELS IN OUNDWATER AS RELATED TO IRRIGA- ON OF JACK PINE WITH SEWAGE EF- UENT,
rest Service (USDA), Cadillac, Mich. North ntral Forest Experiment Station.
H. Urie.
Conference on Recycling Treated Municipal stewater Through Forest and Cropland, August 24, 1972, The Pennsylvania State University, iversity Park, p 157-164. 2 tab, 5 ref.

scriptors: *Nutrients, *Groundwater, osphorus, *Nitrates, Testing, *Sewage ef- ents, On-site tests, Irrigation, Public health, ter table, Soil types, Waste water treatment, simeters, *Jack pine trees.

e North Central Forest Experiment Station has gun research on the effects of sewage effluent groundwater nutrient levels. Results from an in- l test conducted near Cadillac, Michigan are cussed. This exploratory test was conducted to n background information on the methods use- in conducting field tests of sewage effluent ovation where only small volumes of effluent available. The single plot test illustrates that nitrates added in sewage effluent irrigation y reach shallow water tables under sand-soil est conditions. Phosphorus renovation was nplete during the initial year. Public health con- erations may limit the permissible dosage levels such highly permeable soils. Experience with single plot test has resulted in the adoption of ifferent type of field test in locations where vage effluent must be trucked to the test site. ts now in progress utilize plots about 0.001 hec- e in area using gravity methods of application. nsion lysimeters are being used instead of wells test the degree of renovation under various atments. (See also W74-12869) (Sandoski- RL)
4-12878

STORATION OF ACID SPOIL BANKS WITH EATED SEWAGE SLUDGE,
rest Service (USDA), Harrisburg, Ill. Shawnee tional Forest.
R. Lejcher, and S. H. Kunkle.
Conference on Recycling Treated Municipal stewater Through Forest and Cropland, August 24, 1972, The Pennsylvania State University, iversity Park, p 165-178. 4 tab, 15 ref.

scriptors: *Sludge treatment, *Spoil banks, Mu- ipal wastes, Investigations, Hydrogen ion con- tration, Vegetation establishment, Acidity, emcontrol, Runoff, *Illinois, Strip mines, ewage sludge, *Waste water treatment, Water se.

liminary results of a strip mined reclamation nonstration project in Southern Illinois are ailed. The initial observations indicate that treated municipal sludge, when applied to the spoil in sufficient amounts, improves spoil pH, allows establishment of vegetation, and reduces acidity and concentrations of some of the chemicals in the runoff issuing from the tract. (See also W74-12869) (Sandoski-FIRL)
W74-12879

EFFECTS OF LAND DISPOSAL OF WASTE- WATERS ON SOIL PHOSPHORUS RELA- TIONS,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
J. E. Hook, L. T. Kardos, and W. E. Sopper.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 179-195. 5 tab, 11 ref.

Descriptors: *Phosphorus, *Soil disposal fields, Landfills, Monitoring, Sewage effluents, Municipal wastes, Forests, Farm management, Agronomy, Nutrients, *Waste water disposal, *Waste water treatment, *Water reuse, *Path of pollutants.
Identifiers: *Land disposal.

The movement and fixation of phosphorus, a major constituent of many waste waters, are important considerations in land disposal systems. In the Wastewater Renovation and Conservation Research Project at The Pennsylvania State University, the fate of phosphorus has been monitored as treated municipal sewage effluent was applied to cropland and forested areas. Ten years of monitoring has indicated a high degree of efficiency of the soil-plant system to retain and use phosphorus. The chemical forms in which the phosphorus was being retained and to what depth in the soil it was accumulating are described. It is concluded that when the system is properly managed most of the added phosphorus remains in the soil at the disposal site or leaves as a nutrient in harvested crops. (See also W74-12869) (Sandoski-FIRL)
W74-12880

EFFECTS OF LAND DISPOSAL OF WASTE- WATER ON EXCHANGEABLE CATIONS AND OTHER CHEMICAL ELEMENTS IN THE SOIL,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
L. T. Kardos, and W. E. Sopper.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 196-203. 1 fig, 1 tab, 7 ref.

Descriptors: *Reviews, Sampling, *Sodium, *Cations, *Waste water treatment, Forests, Rotations, Boron, Chlorides, Nitrogen, Organic matter, Water reuse, *Path of pollutants, *Soil chemistry.
Identifiers: *Exchangeable sodium percentage.

In a literature review by Ivor K. Edwards (1968) it was indicated that most of the concern with respect to soil chemical changes was with respect to changes in the amounts of sodium relative to the other exchangeable cations in the soil. In soil samples taken in 1966 Edwards found no significant change in the status of the exchangeable cations from that found in 1963 after 48 inches of waste water had been applied. By 1966 the exchangeable sodium percentage (ESP) in the waste water treated areas had increased with respect to the control area about 4-fold in the upper foot and 1.5 to 2-fold in the next four feet. However, the maximum ESP value in 1966 was only 3.3 and occurred in the upper foot of the 2-inch per week treatment area. The present report extends the information through the soil sampling in 1969 and also reports on changes in the status of exchangeable Mn, adsorbed chloride and boron, kjeldahl nitrogen, and organic matter in the crop rotation area and in some of the forested areas. (See also W74-12869) (Sandoski-FIRL)
W74-12881

FACTORS AFFECTING NITRIFICATION- DENITRIFICATION IN SOILS,
California Univ., Davis. Dept. of Soils and Plant Nutrition.
F. E. Broadbent.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 204-214. 5 tab, 18 ref.

Descriptors: *Nitrification, *Denitrification, Soils, *Soil chemical properties, Bacteria, *Nitrogen fixing bacteria, Path of pollutants.

Nitrifying bacteria are present in almost all soils and are active over a wide range of moisture and temperature conditions. Variations are examined where nitrification and denitrification can and do occur simultaneously in the same soil lake, pond, or stream, often in locations physically separated by only very short distances. (See also W74-12869) (Sandoski-FIRL)
W74-12882

BIOTOXIC ELEMENTS IN SOILS,
Illinois Univ., Urbana. Dept. of Agronomy.
T. D. Hinesly, and R. L. Jones.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 215-216.

Descriptors: *Sewage effluents, *Municipal wastes, *Waste water treatment, Tertiary treatment, Chemical properties, Water pollution control, Environmental control, Toxicity, *Path of pollutants, Irrigation, Land management, Trace elements, *Elements(Chemical).
Identifiers: Biotoxic elements.

Application of stabilized municipal waste treatment plant residues on agricultural lands is the most economically viable solution to a growing solids disposal problem. Yet, it is a small problem from the standpoint of its utilization by agriculture. Only enough sludge solids would be available to treat slightly more than 0.2 percent of the 465 million acres of cropland or slightly less than 0.06 percent of the total 1904 million acres contained in the United States. It is recognized that the solids from many small waste water treatment plants will probably continue to be recycled to cropland. Thus it is necessary to attempt to identify those chemical elements which tend to be ubiquitously present in relatively high concentration in municipal waste waters and sludges and might accumulate in soils in forms available to crop plants at concentrations which may be injurious to plants or to animals consuming the produce. (See also W74-12869) (Sandoski-FIRL)
W74-12883

MICROBIAL HAZARDS IN DISPOSING OF WASTEWATER ON SOIL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
D. H. Foster, and R. S. Engelbrecht.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 217-241. 4 tab, 74 ref.

Descriptors: *Reviews, *Public health, *Waste water disposal, Irrigation systems, *Waste water treatment, Investigations, *Water reuse, Pathodogy, Microbiology, Epidemics.

The public health dangers that may arise from the ultimate disposal of wastes on land are explored; public apprehension concerning health hazards are assessed. This work was undertaken to provide officials with the type of information that will allow a rational, unemotional, and realistic assessment of the potential public health problems associated

with the application of waste water to land. It is shown that the literature is quite unusual in the paucity of information available on irrigation-caused epidemics, reflecting either an absence of a problem despite other evidence indicating that significant quantities of pathogens are placed on soil by this practice, or that prejudices which regard only significant outbreaks of disease are worthy of investigation. (See also W74-12869) (Sandoski-FIRL)
W74-12884

VEGETATION RESPONSES TO IRRIGATION WITH TREATED MUNICIPAL WASTEWATER,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. E. Sopper, and L. T. Kardos.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 242-269. 19 tab, 7 ref.

Descriptors: *Irrigation systems, *Sewage effluents, *Waste water treatment, *Water reuse, Investigations, Application techniques, Forests, Farm management, Crops.
Identifiers: Spray irrigation.

The Penn State waste water renovation and conservation project is reviewed. Under this plan, treated municipal sewage effluent has been spray irrigated on cropland and in forest stands for a 10-year period. Effluent has been applied in various amounts ranging from one inch per week to six inches per week and over various lengths of time ranging from 16 weeks during the growing season on cropland to the entire 52 weeks in forests. Rates of application varied from 0.25 to 0.64 inch per week. Types of crops irrigated with effluent were wheat, oats, corn, alfalfa, red clover, and reed canary grass. Forested areas irrigated consisted of a mixed hardwood forest, a red pine plantation, and a sparse white spruce plantation established on an abandoned old field. It is shown that sewage effluent irrigation during the past ten years has produced beneficial vegetation responses. Crop yields and tree growth were significantly increased. In addition the value of the vegetation as a renovating agent has been demonstrated to be a vital part of the system. For year-round operations a combination of cropland and forestland provide the greatest flexibility in operating a system using the living filter concept. (See also W74-12869) (Sandoski-FIRL)
W74-12885

ANATOMICAL AND PHYSICAL PROPERTIES OF RED OAK AND RED PINE IRRIGATED WITH MUNICIPAL WASTEWATER,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. K. Murphey, R. L. Brisbin, W. J. Young, and B. E. Cutter.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 270-285. 6 tab, 24 ref.

Descriptors: *Forests, *Sewage effluents, *Waste water disposal, Groundwater recharge, Pulp and paper industry, Waste water treatment, *Water reuse, *Municipal wastes.
Identifiers: *Spray irrigation, Pulp fibers.

The technique of using the forest to ameliorate treated sewage plant effluent while charging the groundwater can alter the properties of the wood being produced. Primarily this study was concerned with the utility of wood grown in such a forest for pulp wood. The morphology of the pulp fiber is important in the strength and conformity of the paper sheet and, therefore, the utility of the pulp. Alteration of the dimensions of the pulp fibers by the waste water were such as to enhance their use as a raw material for paper. The lack of a separate control area restricted the findings. The results of these experiments indicate that a 1-inch spray enhanced the fiber properties of red pine. A 2-inch application of the effluent was beneficial if red oak is used as a pulp species. (See also W74-12869) (Sandoski-FIRL)
W74-12886

DEER AND RABBIT RESPONSE TO THE SPRAY IRRIGATION OF CHLORINATED SEWAGE EFFLUENT ON WILD LAND,
Pennsylvania State Univ., University Park. School of Forest Resources.
G. W. Wood, D. W. Simpson, and R. L. Dressler.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 286-298. 6 tab.

Descriptors: Evaluation, *Sewage effluents, Irrigation systems, *Deer, Wildlife, Forages, Small game, Water pollution effects, *Water reuse, *Chlorination, Waste water treatment.
Identifiers: *Rabbits, *Spray irrigation, Forage nutrition.

The first efforts in evaluating the effects of sewage effluent irrigation treatment areas on wild animals have been directed toward the principal game species, the cottontail rabbit and the white-tailed deer. Experimental results indicate that the spray irrigation of chlorinated sewage effluent at the rate of two inches per week appears to have a favorable influence on the nutritive value of rabbit and deer forages. Generally the crude protein, P, K, and Mg can be expected to be raised in these forages while the Ca is lowered. Reed canarygrass, the only forage tested for changes in digestibility due to treatment, showed no significant response with respect to digestible dry matter and protein. Studies using the lead deer technique to determine preference for or avoidance of irrigated sites and forage from these sites indicate that the deer use treated sites at least as readily as untreated sites. During the winter period wild deer do not avoid the area but appear to use it quite readily for resting and feeding. (See also W74-12869) (Sandoski-FIRL)
W74-12887

SPRINKLER IRRIGATION SYSTEMS: DESIGN AND OPERATION CRITERIA,
Pennsylvania State Univ., University Park. Dept. of Agricultural Engineering.
E. A. Myers.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 299-308. 1 fig, 2 ref.

Descriptors: *Waste water treatment, *Water reuse, Application techniques, *Design criteria, Administration, *Irrigation systems, *Operations, Land management.

Waste water must be applied uniformly over the land surface at the proper rate in inches per hour and the appropriate amount in inches per week if adequate renovation is to be expected. Two areas which greatly affect this judicious application are proper design and diligent management. This paper first lists the variables involved in the design of an irrigation distribution system, then discusses a number of factors which affect the choice of specific value for each variable. Comments concerning the various management decisions that must be made when operating the system are included. (See also W74-12869) (Sandoski-FIRL)
W74-12888

COST OF SPRAY IRRIGATION FOR WASTE WATER RENOVATION,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
J. B. Nesbitt.
In: Conference on Recycling Treated Municip
Wastewater Through Forest and Cropland, Augu
21-24, 1972, The Pennsylvania State Universit
University Park, p 309-314. 2 fig, 1 tab, 1 ref.

Descriptors: *Estimated costs, *Irrigatio
systems, *Design criteria, Land managemen
Operations, *Waste water disposal, *Waste wat
treatment, Water reuse.
Identifiers: *Spray irrigation, Pumping syste
Delivery system.

The net cost of effluent disposal by spray irrig
tion is dependent upon the system required to do
specific job, at a specific location, at a specif
time, as well as the procedures adopted f
management of the spray field. Since differe
situations require different designs and manag
ment procedures, no general overall cost inform
tion can be given; however, if certain basic a
sumptions are made about design and manag
ment, a rough cost estimate can be made. Th
figures presented are based on work done by A
lender with estimated cost of hypothetical systen
carrying flows of one, five, and ten million gallo
per day being presented. The figures are based
certain assumptions regarding design and manag
ment. These assumptions may or may not
another specific situation but they will define th
basis of the estimates discussed under the gener
areas of pumping system, delivery system, a
operation. (See also W74-12869) (Sandoski-FIRL
W74-12889

**FINANCING MUNICIPAL WASTE WATE
TREATMENT FACILITIES, INCLUDING LAN
UTILIZATION SYSTEMS,**
Environmental Protection Agency, Washingto
D.C. Div. of Municipal Waste Water Programs.
B. L. Seabrook.
In: Conference on Recycling Treated Municip
Wastewater Through Forest and Cropland, Augu
21-24, 1972, The Pennsylvania State Universit
University Park, p 315-321.

Descriptors: *Pollution abatement, *Regulation
Investigations, Industrial wastes, *Waste wat
treatment, Water reuse, *Costs, Legislatio
*Treatment facilities, *Financing.

A continuing need for pollution abatement faci
ties will always exist after standards have be
achieved to compensate for a growing populatio
obsolescence, and industrial expansion. 'Accor
plishing this goal will require the cooperation of i
dustry and dedication at all levels of governmen
Herein detailed are General Accounting Offi
(GAO) studies, recent Federal regulations, indu
trial waste cost recovery guidelines, and clea
water bills. (See all W74-12869) (Sandoski-FIRL)
W74-12890

**LARGE WASTEWATER IRRIGATIO
SYSTEMS: MUSKEGON COUNTY, MICHIGA
AND CHICAGO METROPOLITAN REGION,**
Bauer Engineering, Inc., Chicago, Ill.
W. J. Bauer, and D. E. Matsche.
In: Conference on Recycling Treated Municip
Wastewater Through Forest and Cropland, Augu
21-24, 1972, The Pennsylvania State Universit
University Park, p 322-341. 1 tab.

Descriptors: *Capital costs, *Operating cost
*Irrigation systems, Project planning, *Was
water treatment, Land management, Water reus
*Michigan, *Illinois.
Identifiers: Chicago(Ill), Muskegon County(Mich

The capital and operating costs for the Muskeg
County, Michigan project and for the Chicago R
gional Wastewater plan are presented in a for
useful for making comparisons with alternati
systems. Auxiliary uses of land irrigation sites a
described briefly and the approximate potenti
revenues from each estimated. The operating cos
of the system would be largely, if not entirely, of

by using the same land irrigation site for many
ner purposes in addition to that of renovating the
stewater. No discussion of the benefits of treat-
the waste water to drinking water standards is
esented as these benefits would be comparable
any other system which would achieve the
ne end result. (See also W74-12869) (Sandoski-
RL)
74-12891

**PLEMENTING THE CHICAGO PRAIRIE
AN,**
tropolitan Sanitary District of Greater Chicago,

Kudrna, and G. Kelly.
Conference on Recycling Treated Municipal
stewater Through Forest and Cropland, August
24, 1972, The Pennsylvania State University,
iversity Park, p 342-347.

scriptors: *Project planning, *Recycling,
ewage disposal, *Watershed management, Fil-
s, Application techniques, Monitoring, Water
ality control, *Water reuse, *Illinois, *Waste
ter treatment.
ntifiers: *Chicago Prairie plan.

e Metropolitan Sanitary District of Greater
icago has developed a program for the recycle
l reuse of sewerage solids, the by-products of
water reclamation process. It is a far-reaching,
vironmentally sound program called the 'The
irie Plan'. Based on a principle of watershed
nning, it utilizes the ground as an immense,
ural filter and collection system. Utilizing a sin-
watershed with known physical characteristics
the basis for application, not only do the soil
l living parts act as a filter, but also there is a
tural way to collect all of the filtered runoff at
e point for continuous monitoring and water
ality control. The result is a flowing stream
ich is clean, free from silt, and potentially a
uable resource for recreational, commercial,
l industrial development. The first implementa-
n of 'The Prairie Plan' is being carried out on
er 7000 acres of land in Fulton County, Illinois.
descriptor of the plan is given. (See also W74-
369) (Sandoski-FIRL)
74-12892

**T. SUNAPEE STATE PARK, NEW
MPSHIRE SPRAY IRRIGATION PROJECT,**
w Hampshire Water Supply and Pollution Con-
l Commission, Concord.
P. Frost, R. E. Towne, and H. J. Turner.
Conference on Recycling Treated Municipal
stewater Through Forest and Cropland, August
24, 1972, The Pennsylvania State University,
iversity Park, p 348-361. 8 tab, 3 ref.

scriptors: *Sewage effluents, *Irrigation
stems, Forests, *New Hampshire, Design
teria, Project planning, Data collections,
oundwater, Water quality, Surface waters,
tate Parks, *Water reuse.
ntifiers: *Spray irrigation, *Mt Sunapee St.
rk(NH).

e Sunapee State Park spray irrigation system in
wbury, New Hampshire, distributes pretreated
wage to mountain slopes forested with mixed
rdwoods and scattered conifers interspersed
h an occasional apple tree indicating orchard or
stureland abandoned a generation ago. Conifers
d to dominate the lower part of the slope with
numbers of oaks and birches increased toward
upper levels. The system was planned and
signed around the Pennsylvania State Universi-
project. Preliminary analyses of the data in-
ate that spray irrigating with pretreated sewage
bilization pond effluent has not resulted in any
bstantial or discernible alteration in the com-
sition of the groundwater in the test wells, water
m the drinking wells, or downstream surface
ters. In conclusion, this small, seasonal, atypi-
sewage spray irrigation system appears to have
worked effectively to date to protect contiguous groundwater and surface waters. Based on experience in New Hampshire and Pennsylvania, it is the opinion of the New Hampshire Water Supply and Pollution Control Commission staff that the Sunapee system will probably continue to operate effectively for a long and perhaps indefinite period of time at the present mode of operation. (See also W74-12869) (Sandoski-FIRL)
W74-12893

UTILIZATION OF SPRAY IRRIGATION FOR WASTEWATER DISPOSAL IN SMALL RESIDENTIAL DEVELOPMENTS,
Williams and Works, Inc., Grand Rapids, Mich.
T. C. Williams.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 362-374. 3 tab.

Descriptors: *Waste water treatment, *Treatment facilities, *Michigan, *Irrigation systems, Ponds, Performance, *Design criteria, *Waste water disposal, *Michigan.
Identifiers: *Spray irrigation.

This corporation has designed sixteen pond and irrigation waste water treatment systems for various governmental units in Michigan. Designs for the systems developed include: two facultative ponds designed to operate either in parallel or in series at the discretion of the operator; a series of ponds, consisting of an anaerobic cell followed by at least three facultative cells; and, mechanically aerated ponds followed by holding ponds. Performance and application of these systems are discussed. (See also W74-12869) (Sandoski-FIRL)
W74-12894

ECOLOGICAL AND PHYSIOLOGICAL IMPLICATIONS OF GREENBELT IRRIGATION WITH RECLAIMED WATER,
California Univ., Riverside. Dept. of Plant Sciences.
V. B. Youngner, W. D. Kesner, A. R. Berg, and L. R. Green.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 375-386. 5 tab, 9 ref.

Descriptors: *Feasibility studies, *Waste water treatment, Groundwater recharge, *Water reuse, *Irrigation systems, Recreation demand, Ecology, *Reclaimed water.
Identifiers: *Greenbelt irrigation.

The feasibility of using waste water from the mountain communities to irrigate greenbelts strategically placed would reduce the wildfire hazard while disposing of waste water, recharging groundwater reservoirs with purified water, and creating new manageable recreation areas. Although no conclusive results have been obtained during the short time this study has been underway, observations to date are sufficiently encouraging to make continued study highly worthwhile. Clearly irrigation of chaparral during the dry season will increase the moisture content of the wood and leaves. Conversion of chaparral brush lands to grasses and other plants presenting a lower fire hazard appears possible through waste water irrigation. The most satisfactory species with particular reference to the use of the irrigated areas for recreation must still be determined. (See also W74-12869) (Sandoski-FIRL)
W74-12895

MUNICIPAL WASTEWATER DISPOSAL ON THE LAND AS AN ALTERNATE OF OCEAN OUTFALL,
Bauer Engineering, Inc., Chicago, Ill.
W. A. Cowlishaw, and F. J. Roland.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 387-399. 1 tab.

Descriptors: *Land management, *Waste water disposal, *Waste water treatment, Irrigation systems, *Massachusetts, Groundwater recharge, Water pollution control, Project feasibility, *Alternate planning, Municipal wastes, Water reuse.
Identifiers: *Falmouth(Mass), *Spray irrigation.

Land treatment as an alternative to ocean disposal of partially treated industrial and municipal wastes is examined. The specific decision choice for Falmouth, Massachusetts, is used to highlight the political, engineering, and resource management factor of decisions that juxtapose land treatment and ocean disposal. Analysis indicates that the land disposal-spray irrigation alternatives for managing waste water would better serve the needs of the Falmouth region for its effects in treating waste water; the spray irrigation system is superior. Its pollutant removal efficiency clearly exceeds the ocean outfall system in its effective removal of pollutants. In addition to the efficiency and reliability of this system for purifying waste water, it provides numerous related benefits applicable to the regional water resources. These include: a large percentage return of the treated waste water to the groundwater resources; flexibility for retrieving and transferring treated water; provision of usable crops from the irrigation of marginal land for agricultural purposes; no adverse affect on any marine life or on the recreational value of the waters; and, an integration of the spray irrigation site with numerous other publicly funded projects. (See also W74-12869) (Sandoski-FIRL)
W74-12896

THE ROLE OF LAND TREATMENT OF WASTEWATER IN THE CORPS OF ENGINEERS WASTEWATER MANAGEMENT PROGRAM,
Corps of Engineers, Washington, D.C. Waste water Management Task Force.
J. F. Johnson.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 400-409. 14 ref.

Descriptors: *Project planning, *Land management, *Waste water treatment, Waste water disposal, Project feasibility, Project purposes, Federal government, *Governmental interrelations.

The continuing problems of environmental degradation, particularly that caused by the discharge of a broad spectrum of pollutants into water courses, have prompted the Corps of Engineers to assist state, regional, and local governments in developing waste water management plans toward their solution. As a part of its urban studies program, the Corps will develop an array of plans in consonance with local planning agencies from which the people of the region could choose the specific plan which best meets their needs. The role of land treatment is discussed with particular emphasis upon its relationship to the planning process, the impacts associated with land disposal, and certain research needs related to land disposal of waste water. (See also W74-12869) (Sandoski-FIRL)
W74-12897

MICHIGAN'S EXPERIENCE WITH UTILIZING THE TEN STATES GUIDELINE FOR LAND DISPOSAL OF WASTEWATER,
Michigan Dept. of Public Health, Lansing. Div. of Wastewater.
D. M. Pierce.

In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 410-413. 1 ref.

Descriptors: *Design criteria, *Soil disposal fields, Performance, *Waste water treatment, *Land management, *Waste water disposal, *Michigan, Water reuse.

Nearly fifty communities have designed land disposal systems, yet only two of these have been in operation longer than one year. Even in this early stage of operational experience, some critical deficiencies in design are evidenced. Case illustrations indicate unsatisfactory performance attributable to tight soils with loading capabilities less than assumed in the design of the system, coupled with high groundwater, inadequate drainage, and in one case topography conducive to sheet runoff. Also the State's lack of experience has led to periods of uncertainty and apprenhension with regards to land disposal design and operation. (See also W74-12869) (Sandoski-FIRL)
W74-12898

FOREST SERVICE POLICY RELATED TO THE USE OF NATIONAL FOREST LANDS FOR DISPOSAL OF WASTEWATER AND SLUDGE,
Forest Service (USDA), Washington, D.C. Div. of Watershed Management.
O. C. Olson, and E. A. Johnson.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 414-419.

Descriptors: *Waste water disposal, *Federal Government, *Forests, Soil disposal fields, *Waste water treatment, Sludge treatment, Irrigation systems, *Federal project policy.

With some notable exceptions in the area of land reclamation and rehabilitation, it is generally true that the primary concern of the Forest Service is more one of aiding disposal with minimum deterimental impacts than it is one of looking to onsite benefits. This is in support of the established policy that Forest Service programs contribute to community development and to the improvement of the rural environment in general. At the present time there are 26 sites on National Forests in 14 States involved in planning for land disposal of waste water and/or sludges by sprinkler or flood irrigation. Federal department requirements and general objectives are discussed in relation to the Forest Service policy. (See also W74-12869) (Sandoski-FIRL)
W74-12899

SPRAY IRRIGATION--THE REGULARTORY AGENCY VIEW,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Ground Water Quality Management Unit.
R. C. Rhindress.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 420-434.

Descriptors: *Irrigation systems, *Regulation, Environmental control, Waste disposal, Soil disposal fields, *Pennsylvania, Legal aspects, *State governments.
Identifiers: *Spray irrigation.

The Bureau of Water Quality Management of the Pennsylvania Department of Environmental Resources is the regulatory agency concerned with the protection from pollution of all the waters within the state. A regulatory agency becomes aware of spray irrigation from two separate sources: as a new technique being promoted and as enforcement officials viewing a number of existing problems. An environmental protection agency has an obligation to consider all techniques of waste disposal and to assess their applicability to various wastes and their impact upon the environment. The experiences of the department with spray irrigation are discussed together with the philosopy concerning the use of land disposal techniques, and some important concepts which are included in their Spray Irrigation Manual. (See also W74-12869) (Sandoski-FIRL)
W74-12900

RESEARCH NEEDS--LAND DISPOSAL OF MUNICIPAL SEWAGE WASTES,
Forest Service (USDA), Washington, D.C.
J. O. Evans.
In: Conference on Recycling Treated Municipal Wastewater Through Forest and Cropland, August 21-24, 1972, The Pennsylvania State University, University Park, p 435-442, 1 fig, 6 ref.

Descriptors: *Reviews, *Conferences, Research and development, Municipal wastes, Sewage disposal, Recycling, Soil disposal fields, *Research priorities, *Waste water disposal, *Water reuse, *Waste water treatment.

A review of topics discussed throughout the conference is presented. Immediate research needs with regards to municipal sewage waste disposal include: the mechanics for efficient and effective handling of sewage wastes and disposal on various land areas; economic factors relative to various or alternative handling and disposal methods; waste-management problems having their roots in the social, economic, legal, and political areas; the interactions between various soil types and applied wastes; transport methods and costs, from sewage source to disposal site; soil microorganisms to degrade, stabilize, and render sewage wastes innocuous; pathogen transfer to susceptible hosts as a function of time since spreading and previous treatment of the sludge; alternative treatments in effluent disposal to eliminate health hazards from nitrates and other toxic substances; long-term effects of various sludges on appropriate land areas; the tolerance of crops and forests to various heavy metals deposited with organic sewage sludges; effluent and sludge recycling in areas that remain frozen over extended periods of time; standards and guidelines for the use of sewage effluent as irrigation-fertilization and aquifer recharge water, and of sewage sludge as a fertilizer and soil conditioner; toxic conditions in plants resulting from excessive phosphate accumulations in soils; and how odor problems can be prevented, eliminated, or effectively controled. (See also W74-12869) (Sandoski-FIRL)
W74-12901

ECOLOGY AND ANALYSIS OF TRACE CONTAMINANTS, PROGRESS REPORT JUNE 1972-JANUARY 1973.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12905

ZONAL CENTRIFUGATION: APPLIED ASPECTS IN ELUCIDATING CHEMICAL AND BIOLOGICAL FORMS, DISTRIBUTION AND AVAILABILITY OF HEAVY METALS IN THE ENVIRONMENT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12910

REMOVAL OF MERCURY AND OTHER TOXIC METALS FROM PLANT EFFLUENT SOLUTIONS BY SOLVENT EXTRACTION,
Oak Ridge National Lab., Tenn.
F. L. Moore.
In: Report No. ORNL-NSF-EATC-1, p 349-365, March 1973. 2 fig, 5 tab, 7 ref.

Descriptors: Water pollution, Pollution abate
ment, *Metals, *Toxins, *Mercury, *Cadmium
Effluents, *Industrial wastes, *Solvent extrac
tions, Research and development, Ammonium
Chlorides, *Waste water treatment.

Research and development studies have led to
new, practicable industrial separation methods fo
pollution abatement of toxic metals. Current majo
emphasis is on the removal of mercury and cadmi
um from industrial effluent solutions. Solvent ex
traction with high-molecular-weight amines is a
highly efficient method for the removal of these
toxic metals from aqueous halide solutions. The
quaternary amines, Aliquat 336 or Adogen 464
(methyltri(C8-C10)ammonium chlorides) are espe
cially attractive because of their ability to extrac
mercury or cadmium at both subnanogram and
macro levels from alkaline as well as acidic
chloride, bromide or iodide solutions. These stu
dies have developed a simple process for the
abatement of mercury pollution in industrial brines
and hydrochloric acid solutions. Studies in the
amineiodide system led to a new method for the
isolation and concentration of cadmium and mer
cury. Moreover, the technique achieves the quan
titative separation of cadmium from mercury. (See
also W74-12905) (Houser-ORNL)
W74-12917

**ELECTROCHEMICAL REMOVAL OF REDUCI
BLE INORGANIC POLLUTANTS FROM AQUE
OUS STREAMS,**
Oak Ridge National Lab., Tenn.
F. A. Posey, and A. A. Palko.
In: Report No. ORNL-NSF-EATC-1, p 367-389
March 1973. 11 fig, 6 ref.

Descriptors: *Water pollution treatment, Streams
*Mercury, *Electrochemistry, *Electrodes, Ions
Carbon, Brines, Pollution abatement, *Waste
water treatment.

Results of studies on removal of dissolved mercu
ry from flowing streams by porous carbon elec
trodes are presented. The effects of complexin
agents, temperature, pH, and other factors on the
rate of reduction of mercuric ion on a carbon sub
strate are discussed. Construction details of an ex
perimental assembly for measurement of remova
efficiencies of porous carbon electrodes are
presented, along with experimental results on mer
cury removal from simulated chlor-alkali plan
brine. The mode of deposition of mercury on car
bon electrodes is discussed and implications fo
development of practical mercury-remova
devices are noted. (See also W74-12905) (Houser
ORNL)
W74-12918

**WASTE WATER TREATMENT AND SLUDGE
DISPOSAL AT THE CESKA KAMENICE PAPER
MILL (CISTENI ODPADNICH VOD A LIK
VIDACE SEDIMENTU V ZAVODE 25. UNOR
V CESKA KAMENICI),**
Ceska Kamenice Paper Mill (Czechoslovakia).
J. Lukac.
Papir a Celuloza, Vol 29, No 3, p 61-62, 1974. 3 fig
2 tab.

Descriptors: *Centrifugation, Treatment facilities
Europe, *Waste water treatment, *Sludge treat
ment, *Sludge disposal, Waste treatment, *Pulp
wastes, Pulp and paper industry, Equipment, Ef
fluents, Dewatering, Lime, Fibers(Plant)
Recycling.
Identifiers: *Czechoslovakia, Board mills, Paper
mills, Sulfite pulp mills.

An effluent-treatment facility installed in 1964 at
Czechoslovakian pulp and paper mill comprised
mixing chamber for lime dosage and two clarifiers
Clarifier sludge was reused in paper and paper
board furnishes. Shutdown of the sulfite pulp mil
and other water management measures betwee
1966-1970 substantially reduced the effluen

me, but also changed the quality of sedi-
ed sludge. In lieu of long fibers, the sludge
ained a mixture of fines (fine fibers) and inor-
fillers which could no longer be recycled and
ired temporary pond storage. For treatment of
sludge, a VS-500 Alpha-Laval centrifuge hav-
throughput of 18 cu m/hr and a capacity of
g dry solids/hr was installed to dewater gravi-
ickened clarifier sludge from 4% to 23.8% of
olids. (Trubacek-IPC)
-12921

COLOR OF WASTE LIQUOR FROM PULP
USTRY. IV. THE INTERACTION OF CL(2)-
LIGNIN WITH METAL SALTS (2), (IN
ANESE),
hu Univ., Fukuoka (Japan). Faculty of
culture.
meshima, M. Sumimoto, and T. Kondo.
nal of the Japan Wood Research Society
uzai Gakkaishi), Vol 20, No 1, p 21-25, Jan
8 fig, 13 ref. (English summary).

riptors: *Pulp wastes, *Bleaching wastes,
or, *Lignins, *Chlorine, Waste treatment,
culation, *Waste water treatment, Alu-
m, *Coagulation, Chemical precipitation,
rogen ion concentration, *Chelation, Nitrates,
icochemical properties, Chlorination, Pulp
aper industry, Foreign research.
ifiers: Chelates, Complex compounds, Alu-
m nitrate, Aluminum compounds, Chlorine
ounds, Japan, Quinones, Protocatechuic
Benzoquinone, Kraft pulps.

rinated oxidized lignin is the main coloring
tance in spent liquors from multistage
hing of kraft pulp. Its reaction with metal
notably aluminum nitrate, was studied as an
tive decoloring treatment. The dosage needed
0% color removal increased with increasing
f the liquor. Although the optimum pH could
e ascertained accurately, it is about pH 5,
ng from the physical properties of
pitated flocs. The major coagulation
anism involves chelate formation below pH
e chelating sites of chloro-oxylignin being
ably hydroxybenzoquinone and
ocatechuic acid structures in the lignin
omolecule. Chelation below pH 5 differs
chelate formation at higher pH. (See also
-04512) (Brown-IPC)
-12924

YCLING HELPS PAPER MILLS CLEAN UP
IR IMAGE.
nical Week, Vol 114, No 18, p 33-34, May 1,
2 fig.

riptors: Waste treatment, *Pulp wastes,
ste water treatment, *Water conservation,
ite liquors, *Treatment facilities, Pulp and
r industry, *Recycling, Solid wastes, Ef-
ts, Capital costs, Operating costs, Costs,
nomics, Biochemical oxygen demand, Water
umption(Except consumptive use), Sodium
ounds, South Carolina, Washington, Pulp
aper industry.
ifiers: Sulfite pulp mills, Paperboard mills,
t sulfite liquors, Chemical recovery.

new processes developed by Sonoco
ucts Co. (Hartsville, S.C.) and Fibreboard
. (Summer, Wash.) have cut the costs of
e water treatment while recovering and con-
ng valuable raw materials. The Sonoco
ess recovers sodium sulfate, carbonate, and
oxide from spent Na-base sulfite pulping
r in an installation costing ca. $2-2.5 million,
at a recovered chemical cost of $5 per ton,
pared to $12 per ton for most other treatment
ms. The smaller Fibreboard facility recovers
600 lb/day of solid wastes from effluents
iously discharged into the Stuck River and
cles them into paperboard furnish, while
cing the BOD of discharged wastes by ca. 95%
and the consumption of freshwater from 940,000 to 450,000 gal/day. (Witt-IPC)
W74-12927

WASTEWATER TREATMENT: PHYSICAL AND CHEMICAL METHODS,
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
F. A. DiGiano, and A. B. Scaramelli.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1109-1121, June, 1974. 1 tab, 131 ref.

Descriptors: *Nutrient removal, *Organic compounds, *Colloids, *Waste water treatment, *Reviews, *Bibliographies, Nutrients, Coagulation, Carbon, Adsorption, Filtration, Reverse osmosis, Ion exchange, Ozone, Nitrogen, Phosphorus, Water pollution control, Costs, Operating costs, Pulp wastes, Pulp and paper industry, Industrial wastes, Waste treatment, Economics, Color.

The 1973 literature on physical-chemical methods for the removal of nutrients, biodegradable and nonbiodegradable organics, and colloidal suspensions from waste water is reviewed. Chemical coagulation, carbon adsorption, and filtration methods are discussed. The present stage of development of reverse osmosis, ion-exchange, and ozone processes for the removal of these substances is also covered. Chemical coagulation has been used, e.g., to decolor a kraft pulp mill effluent (by massive lime treatment), and reverse osmosis has successfully been used in paper mills as a means of concentrating effluent. Operating costs for the various treatment processes are given. (Witt-IPC)
W74-12934

WASTEWATER TREATMENT: ACTIVATED SLUDGE,
McKee (Arthur G.) and Co., San Mateo, Calif.
H. S. Azad, and C. L. Weddle.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1123-1135, June, 1974. 124 ref.

Descriptors: *Reviews, *Bibliographies, *Activated sludge, *Waste water treatment, Industrial wastes, Phosphorus, Nitrogen, Nutrient removal, Design, Operations, Aeration, Oxygenation, Computer models, Mathematical models, Pulp wastes, Chemical wastes, Water pollution control, Waste treatment, Food processing industry.
Identifiers: Refinery wastes, Printing wastes, Cannery wastes.

The 1973 literature on the treatment of waste waters by the activated sludge process is reviewed. Topics discussed include: process innovations and applications; industrial waste water treatment; phosphorus and nitrogen removal; plant design and operation; aeration and oxygenation; and mathematical models and computer simulations of the activated sludge process. Refinery, pulp and paper, chemical, printing, and cannery wastes are cited as examples of some of the waste materials that are being treated by the activated sludge process. (Witt-IPC)
W74-12935

WASTEWATER TREATMENT: LAGOONS AND OXIDATION PONDS,
Kansas Univ., Lawrence.
C. E. Burkhead, and W. J. O'Brien.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1135-1140, June, 1974. 71 ref.

Descriptors: *Reviews, *Bibliographies, *Lagoons, *Oxidation lagoons, *Waste water treatment, Industrial wastes, Municipal wastes, Aerobic treatment, Anaerobic digestion, Water pollution control.

A review is presented of the 1973 literature on the use of aerobic, anaerobic, and combination lagoons and oxidation ponds for the treatment of industrial and municipal waste waters. (Witt-IPC)
W74-12936

WASTEWATER TREATMENT: ANAEROBIC PROCESSES,
Institute of Gas Technology, Chicago, Ill.
S. Ghosh, and J. R. Conrad.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1145-1161, June, 1974. 98 ref.

Descriptors: *Anaerobic digestion, *Reviews, *Bibliographies, *Waste water treatment, *Microbiology, Solid wastes, Municipal wastes, Industrial wastes, Energy, Cellulose, Degradation(Decomposition), Sulfur compounds, Organic compounds, Inorganic compounds, Reduction(Chemical), Anaerobic bacteria, Denitrification, Nitrogen fixation, Biodegradation, Wastes, Pulp wastes, Biochemistry.

This 1973 literature review on anaerobic processes covers the microbiology and biochemistry of some of the non-methanogenic processes including the mechanism of the following reactions: cellulose degradation; reduction of inorganic and organic sulfur compounds; photosynthetic and non-photosynthetic hydrogen production; anaerobic nitrogen fixation; and anaerobic denitrification. In the areas of process development and application, studies directed toward the development of anaerobic digestion-based systems capable of reclaiming the intrinsic energy content of municipal, industrial, and agricultural liquid and solid wastes are reviewed. (Witt-IPC)
W74-12937

WASTEWATER TREATMENT: SLUDGE TREATMENT, UTILIZATION, AND DISPOSAL,
Delaware Univ., Newark. Dept. of Civil Engineering.
R. I. Dick.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1161-1181, June, 1974. 220 ref.

Descriptors: *Reviews, *Bibliographies, *Sludge treatment, *Sludge disposal, Sludge, Dewatering, Incineration, Nutrient removal, Industrial wastes, Drying, Water treatment, Ammonia, Nitrogen compounds, Phosphorus compounds, Pulp and paper industry, Pulp wastes, *Waste water treatment.

Literature published during 1973 on the management of sludge from waste water and water treatment plants is reviewed. The topics covered include: recovery of nutrients (such as ammonia, nitrate, phosphate) from sludge; handling, treatment, and disposal of industrial sludges (e.g., sludge from pulp and paper mill waste water treatment) and from water treatment plants; sludge constituents; conditioning; thickening; dewatering; combustion and heat drying; reclamation: and ultimate disposal. (Witt-IPC)
W74-12938

WASTEWATER TREATMENT: WATER RECLAMATION AND REUSE,
National Environmental Research Center, Cincinnati, Ohio.
I. J. Kugelman.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1195-1201, June, 1974. 61 ref.

Descriptors: *Reviews, *Bibliographies, *Water reuse, *Reclaimed water, Planning, Irrigation, Groundwater recharge, Potable water, Industrial water, Waste water treatment, Municipal water, Water resources, Water conservation, Water utilization, Effluents, Pulp and paper industry.

A review is presented of the 1973 literature on water reclamation and reuse. It covers reuse in

water resources planning, industrial reuse of water (e.g., in the pulp and paper industry), reuse of treatment waste water for irrigation and groundwater recharge, indirect reuse of discharged waste waters (i.e., discharge of treated waste waters to rivers or lakes that are used as sources of water supply by other communities), direct potable reuse of renovated waste water, and advanced waste treatment technology for production of industrial water. (Witt-IPC)
W74-12939

WASTEWATER TREATMENT: LAND DISPOSAL OF WASTEWATER,
New York State Dept. of Environmental Conservation, Albany.
T. J. Tofflemire, and F. E. Van Alstyne.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1201-1208, June, 1974. 96 ref.

Descriptors: *Reviews, *Bibliographies, *Waste water disposal, *Irrigation, Irrigation effects, Plant growth, Technology, Nutrients, Underground waste disposal, Waste disposal wells, Injection wells, Municipal wastes, Industrial wastes, Soil bacteria, Flood irrigation, Surface irrigation, Soil disposal fields, Anions, Cations.

A review is presented of the 1973 literature dealing with land disposal of waste waters. It covers general principles, individual systems (e.g., spray irrigation systems), technical aspects (such as the influence of waste water on cation and anion movement in the soil, buildup of sodium salts in the soil as a result of waste water disposal, criteria for operation and maintenance of irrigation and drainage systems, soil microbial activity), nutrient travel in the soil, and deep well disposal of waste waters. (Witt-IPC)
W74-12940

INDUSTRIAL WASTES: PAPER AND APPLIED PRODUCTS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
G. W. Gove, and I. Gellman.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1235-1280, June, 1974. 277 ref.

Descriptors: *Reviews, *Bibliographies, *Pulp and paper industry, *Waste water treatment, Water quality standards, Analytical techniques, Bioassay, Pulp wastes, Industrial wastes, Reverse osmosis, Ion exchange, Electrodialysis, Electrolysis, Byproducts, Sulfite liquors, Bark, Water conservation, Water reuse, Flotation, Oxidation, Ozone, Sludge disposal, Activated sludge, Aerated lagoons, Irrigation, Lime, Fly ash, Water pollution control, Color.
Identifiers: Chemical recovery, Ethyl alcohol, Sulfate soap, Flotation aids, White water, Black liquor, Biofiltration, Waste paper, Turpentine.

The 1973 literature on the treatment of wastes from the manufacture of pulp and paper and allied products is reviewed. Included are government policies (united States and foreign) regarding waste water treatment and water quality standards; sources and treatment of effluents in the pulp and paper industry; receiving waters and bioassay studies; chemical composition of pulping, bleaching, and miscellaneous mill effluents; chemical recovery from effluents via. reverse osmosis, ion-exchange processes, electrodialysis, and electrolysis; by-product recovery (including ethyl alcohol by fermentation of yeast on spent sulfite liquor, sulfate soap recovery from draft mill effluents, and bark); solids recovery from and renovation and reuse of pulping, bleaching, and papermaking effluents; reuse of municipal waste water treatment plant effluent for papermaking; color reduction of kraft pulp mill effluents by treatment with lime or fly ash or by ion-exchange processes; polishing treated mill effluents by filtration; flotation aids for improving the efficiency of white water clarification; weak black liquor oxidation, ozonation of pulp mill wastes, and stripping of turpentine decanter underflow and evaporator condensates; sludge handling and disposal; secondary effluent treatment (activated sludge, aerated stabilization basins, and biofiltration); waste disposal by land irrigation; and waste paper recycling. (Witt-IPC)
W74-12941

BIOCHEMICAL DEGRADATION BEHAVIOR OF SULFITE PULP MILL WASTE WATER AND ITS CONSTITUENTS (BIOCHEMISCHES ABBAUVERHALTEN VON SULFITZELLSTOFFABWASSER UND SEINEN INHALTSSTOFFEN),
For primary bibliographic entry see Field 5B.
W74-12942

ESTABLISHMENT OF A CLOSED SYSTEM FOR THE PAPERMAKING PROCESS,
Mo och Domsjo A.B., Ornskoldsvik (Sweden).
S. Martin-Lof, T. Franzen, C. Heinegard, C. Soremark, and D. Wahren.
Tappi, Vol 56, No 12, p 121-126, Dec 1973. 8 fig, 2 tab.

Descriptors: *Industrial water, *Recirculated water, Closed conduits, *Water reuse, Pulp and paper industry, *Water conservation, Environmental control, *Water pollution control, Pollution abatement, Recycling, Economics, Temperature, Operation and maintenance, Equipment, Monitoring, Waste water(Pollution), Slime, Drainage, Drainage practices, Suspended solids.
Identifiers: White water(Paper machine), Fourdrinier machines, Paper machines, Chemical consumption, Heat consumption, Paper products.

Environmental protection of waterways from paper mill discharges can be achieved by closing the white water circuit of paper machines. Swedish experience with a closed-system newsprint machine indicated that at least part of the normally discharged pollutants (fiber fragments, fillers, and dissolved wood components) can be recycled and included in paper products without detriment to their quality. Some paper properties, such as optical and mechanical characteristics, can actually be improved by thus retaining greater amounts of furnish components. Moreover, savings in fiber and heat consumption can amount to as much as $1 to $5 per ton of paper produced. Operating conditions of paper machines must, however, be carefully adjusted and monitored. Some of the necessary modifications, such as increased white water temperatures, can have beneficial effects, notably faster drainage of water from the fourdrinier wire and reduced slime problems. (Brown-IPC)
W74-12944

DECOLORIZATION OF KRAFT MILL EFFLUENT,
Rohm and Haas Co., Philadelphia, Pa.
D. C. Kennedy, and L. R. McConnell.
Southern Pulp and Paper Manufacturer, Vol 37, No 1, p 26-28, Jan 1974. 2 fig, 3 tab.

Descriptors: *Waste treatment, *Pulp wastes, *Bleaching wastes, *Color, *Adsorption, Costs, Capital costs, Operating costs, Softwood, Hardwood, Polymers, Resins, Organic compounds, Effluents, *Waste water treatment, Pulp and paper industry, Industrial wastes.
Identifiers: Amberlite resins.

Colored organic matter can be successfully removed from kraft pulp bleaching effluents by treatment with Amberlite XAD-8 adsorbent beads. A process flow diagram is shown for a system said to remove 66-78% of the color from softwood and 75-83% from hardwood pulp bleaching effluents. Estimates of capital and operating costs indicate economies superior to those of other currently used effluent-decoloring processes. (Hansen-IPC)
W74-12945

CLARIFICATION OF NSSC SPENT LIQUO WITH ACTIVATED SLUDGE AND COAGU LANTS (IN JAPANESE),
Hokkaido Univ., Sapporo (Japan). Chemic Utilization Lab.
O. Ebinuma, S. Satonaka, and M. Hanzawa.
Research Bulletins of the College Experime Forests, Hokkaido University, Vol 30, No 1, 183-203, 1973. 15 fig, 7 tab, 24 ref. (English sur mary).

Descriptors: *Sulfite liquors, Waste treatmer *Pulp wastes, *Waste water treatment, *Activate sludge, *Coagulation, Aluminum, *Lignins, Ca bohydrates, Biochemical oxygen demand, Chem cal oxygen demand, Suspended solids, Hydroge ion concentration, Nutrients, Microorganism Dissolved oxygen, Foreign research, Pulp a paper industry.
Identifiers: Aluminum sulfate, Aluminu chloride, Aluminum compounds, Japan, Coag lants.

A spent liquor from the neutral sulfite semichem cal pulping of wood was subjected to activate sludge treatment and to coagulation with al minum sulfate or chloride. The liquor contain 109.5-115.3 g of total solids, 30.5-32.3 g of a (minerals), 435 g of COD, and 363 g of BOD p liter and had a pH of 6.60-7.25. Acclimatization the sludge was completed within 8 days, at whi time Vorticella, Carchesium, and Rotaria were t dominant microorganisms. With increased BO loading from 1000 to 2400 mg/liter, the BO removal efficiency decreased from 83% to 66% a BOD:N:P ratio of 80:5:1. Carbohydrates were most quantitatively removed in 3 hr, but only 12 of the lignin was removed even after 22 hr. The p rose from 7.25 to 8.10 within 2 hr, then dropp gradually to 7.60. Dissolved oxygen decreas from 7.6 to 1.6 ppm within 1 hr, then increased 6.85 ppm after 22 hr, indicating rapid bio-oxidati during the initial treatment stage. The addition aluminum sulfate (0.00522 M/g of lignin) to the u treated liquor (at pH 4.5) or to the biological treated liquor (at pH 5.5-6.0) removed up to 46% the lignin. Aluminum chloride was less effective similar dose removed 43% of lignin from the u treated but only 34% from the biological pretreated liquor. (Brown-IPC)
W74-12946

MICROBIOLOGICAL PURIFICATION O HYDROGEN SULFIDE CONTAINING WAST WATERS FROM SULFATE PULP PRODU TION (MIKROBIOLOGICHESKAYA OCHIS KA SEROVODORODNYKH STOCHNYKH VO SULFATNOTSELLYULOZNOGO PROI VODSTVA),
N. I. Tkachenko, and L. B. Pomerants.
Prikladnaya Biokhimiya i Mikrobiologiya, Vol No 5, p 569-573, 1972. 2 fig, 1 tab, 18 ref. (Engli summary).

Descriptors: *Waste water treatment, *Sulf compounds, *Hydrogen sulfide, *Sulfides, *Pu wastes, Waste treatment, *Filtration, *Biologic treatment, Microorganisms, Bacteria, *Sulfur ba teria, Effluents, Sulfur, Hydrogen ion concentr tion, Foreign research.
Identifiers: Kraft pulp mills, Thiobacillus thioo idans, Thiobacillus thioparus, Sovi Union(USSR), Digester condensates.

In continuation of earlier studies on the removal hydrogen sulfide from digester exhaust conde sates and other kraft mill waste waters, laborato experiments were conducted on the effects biological filters on model effluents containi sodium sulfide and ammonium sulfate as nitrog source. Samples were analyzed for microflo composition, redox potential, pH, rH, and S co pounds before and after passage through the filte An initial increase in counts of saprophytic ba teria and Thiobacillus thioparus during filter fo mation was accompanied by drastic reduction hydrogen sulfide and increased sulfate content

Th. thioparus count reached a maximum after
ıt one month, but other sulfur bacteria (such
Th. thiooxidans and sulfur-reducing bacteria)
e absent at Ph above 7.6. Since elementary sul-
was retained on the filter slag, no S was con-
ed in the purified effluent during the filter-
ning stage. Later, the bacterial film was
hanically washed away, along with elementary
o that the latter could be recovered and recy-
to the cooking liquor preparation stage. A sul-
naterial balance for 80 days of biological filtra-
is tabulated. (Stapinski-IPC)
-12949

USTRIAL WASTE DISPOSAL MADE
OFITABLE,
do Univ., Ohio.
. Bennett, and L. Lash.
mical Engineering Progress, Vol 70, No 2, p
5, Feb 1974. 5 fig, 5 tab, 71 ref.

criptors: *Byproducts, *Pulp wastes,
ustrial wastes, Waste treatment, *Waste
er treatment, Liquid wastes, *Sulfite liquors,
asts, *Proteins, *Fermentation, Microorgan-
, Alcohols, Economics, Food processing in-
ry, Chemical wastes, Chemical industry.
tifiers: Sulfite alcohol, Ethanol(Ethyl al-
ol), Spent pulping liquors, Spent sulfite liquor.

y industrial waste streams can be regarded as
placed natural resources having latent poten-
for recovery of saleable byproducts. Nu-
ous successful recovery applications in vari-
industries, including the food and chemical in-
ries, are cited as illustrations. Methods of
te water purification for reuse are also
ussed. Specific mention is made of the
robiological fermentation of spent sulfite pulp-
liquors for production of yeast and ethyl al-
ol ('sulfite alcohol'). (Hansen-IPC)
-12951

ING ENERGY THROUGH RECYCLING
ER MILL PROCESS WATER,
. Eimmerman.
erican Paper Industry, Vol 56, No 4, p 20-22,
il 1974. 2 fig.

criptors: *Water conservation, *Water con-
ption(Except consumptive use), *Industrial
er, Freshwater, *Recirculated water, *Pulp
paper industry, *Waste water treatment,
atment facilities, *Wisconsin, United States,
t balance, Heat, *Energy, Energy loss,
cycling.
tifiers: Paper machines, White water, Deink-
Waste paper.

ystematic mill-wide water conservation pro-
n at Wisconsin Tissue Mills in Menasha,
consin, managed to reduce freshwater con-
ption from about 2.3 to 1.3 million gallons per
, in addition to saving thermal energy of about
0,000 Btu/hr or 3750 lb of steam per hour. A
ntly completed waste water treatment installa-
is expected to decrease the mill's water con-
ption to 0.75 million gal/day. The engineering
eys and calculations of water flows and water
nces that led to these drastic improvements in-
ed both of the mill's paper machines and its
te paper deinking plant. Illustrative diagrams
hese schemes are presented. Some of the
blems that had to be overcome during the water
servation drive, as well as those that may arise
n further freshwater saving measures, are in-
ted. (Wise-IPC)
-12952

TREATMENT SYSTEM FOR WASTE
POSAL OF FLEXO INK AND STARCH.
an Corrugated Board and Box Inst., Tokyo.
an Pulp and Paper, Vol 11, No 2, p 50-52, July
3. 1 tab.

Descriptors: Waste treatment, *Waste water treatment, *Pulp wastes, *Sludge treatment, Treatment facilities, Chemical precipitation, *Coagulation, *Flocculation, Recirculated water, *Water reuse, *Industrial water, Water conservation, Foreign research, Industrial wastes, Chemical wastes, Biochemical oxygen demand, Chemical oxygen demand, Sedimentation, Suspended solids, Filters, Filtration, Dewatering, Carbohydrates, Adhesives.
Identifiers: Starch, Corrugated boxes, Corrugated boards, Starch paste, Inks, Printing inks, Flexographic inks, Wash water, Converting plants(Paper), Ferric chloride, Japan.

A chemical treatment system for corrugated box factory waste waters has been developed in Japan. Effluents containing corrugating starch paste and flexographic printing ink wastes are combined, flocculated and precipitated with ferric chloride, calcium or sodium hydroxide, and/or organic coagulant aids. The clarified waste water is recycled and reused for preparation of more starch paste and as wash-up water for the flexographic printing presses. The sedimented sludge is chemically conditioned and dewatered, using a patented NTS filter. The treatment system is said to remove 82% of suspended solids, 97% of COD, and 96.4% of BOD from the waste water at reasonable costs for chemicals and power consumption. Some cost data are given, along with an outline description of the process. (Witt-IPC)
W74-12954

BIOLOGICAL REMOVAL OF LIGNIN FROM KRAFT MILL EFFLUENTS: CHANGES IN MOLECULAR SIZE DISTRIBUTION,
Toronto Univ. (Ontario).
T. I. Obiaga, and J. Ganczarczyk.
Tappi, Vol 57, No 2, p 137-138, Feb 1974. 2 fig, 1 tab, 2 ref.

Descriptors: *Lignins, *Biological treatment, *Pulp wastes, *Molecular structure, *Chemical oxygen demand, *Color, *Waste water treatment, Waste treatment, Pulp and paper industry, Effluents, Biomass.
Identifiers: Black liquors, Alkali lignins, Kraft mills, Molecular weight.

The activated sludge treatment of simulated kraft mill effluents (diluted black liquors) resulted in significant reductions of COD, nitrosolignin color, and visible color. In typical effluents, the molecular weight distribution of lignin did not change appreciably. In about 10% of the effluents, which were considered atypical or abnormal, the molecular weight increased along with decreases in color and COD removals. The biological removal of alkali lignin is thought to occur largely through sorption or bridging action on biomass. (Buchanan-IPC)
W74-12957

INTENSIFICATION OF SAND FILTER OPERATION (INTENSIFIKATSIYA RABOTY PESCHENYKH FIL'TROV),
All-Union Research Inst. for the Paper Industry, Astrakhan (USSR).
G. A. Romanov, G. P. Kuchin, Yu. M. Smirnov, and A. E. Perednya.
Bumazhnaya Promyshlennost', No 1, p 14-15, Jan 1974. 2 fig, 1 tab.

Descriptors: *Filtration, *Filters, *Clogging, Treatment facilities, *Pulp wastes, *Waste water treatment, Waste treatment, *Industrial water, Operation and maintenance, Pulp and paper industry, Effluents, Lignins, Organic acids, Soaps, Lipids, Pressure, Pressure head, Pressure conduits, Piping systems(Mechanical), Sands, Gravels, Recirculated water, Water reuse.
Identifiers: Kraft pulp mills, Tall oil, Sulfate soap, Rosin acids, Wash water(Shower water), *Sand filters, USSR.

Earlier studies had shown that the filtration of pretreated (chemically and biologically purified) kraft mill effluents through sand yields water suitable for industrial reuse. However, the passage of chemically pretreated effluent resulted in the formation of a thin film on the filter surface, caused by gradual accumulation of lignin, tall oil, sulfate soap, rosin acids, and fatty acids. As a consequence, the density of this surface deposit increased to the extent that, after 3-4 months of operation, it could no longer be removed by conventional washing. Special washing equipment was, therefore, developed. It consists essentially of a system of water-distributing pipes and a series of washing caps with openings through which the wash water is delivered under pressure. Operating tests indicated that an adequate pressure (at least 10 m of water column for effluents containing up to 30 mg/liter of suspended solids) will fracture the surface films into small particles that are readily washed away. (Stapinski-IPC)
W74-12958

FINAL PURIFICATION OF BIOCHEMICALLY TREATED EFFLUENTS FROM WOOD ROSIN EXTRACTION FACTORIES (DOOCHISTKA BIOKHIMICHESKI OCHISHCHENNYKH STOKOV KANIFOL'NO-EKSTRAKTSIONNOGO PROIZVODSTVA),
Tsentralnyi Nauchno-Issledovatelski Lesokhimicheski Institut, Khimki (USSR).
A. I. Firsov, N. P. Drozdov, and V. P. Malev.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', No 1, p 6-7, 1974. 2 fig, 3 tab, 1 ref.

Descriptors: *Activated carbon, Water treatment, *Waste water treatment, *Color, *Odor, Taste, *Industrial wastes, Potable water, Water purification, *Adsorption, Recycling, Effluents, Waste treatment, Steam, Particle size, Wood waste.
Identifiers: Rosin, Silvichemicals, Naval stores, Wood rosin, USSR.

Adsorption on activated carbon was found to remove color, malodor, and unpleasant taste from the biochemically treated waste waters of wood rosin extraction factories. The purified water was suitable for potable water supplies of population centers. The spent carbon could be regenerated by treatment with superheated steam at 650-700C. The purification degree was independent of the number of regenerative cycles and nearly independent of the carbon particle size between 0.5 and 3.0 mm. (Stapinski-IPC)
W74-12960

REDUCTION OF WASTE WATER POLLUTION IN PAPERBOARD MILLS (SNIZHENIE ZAGRYAZNENIYA STOCHNYKHVOD NA KARTONNYKH FABRIKAKH),
Ukrainskii Nauchno-Issledovatelskii Institut Bumagi, Kiev (USSR).
N. A. Gavrishova, T. A. Dudarenko, V. P. Svitelskii, V. A. Kovba, and S. A. Lashchenko.
Bumazhnaya Promyshlennost', No 1, p 15-16, Jan 1974. 1 fig, 2 tab.

Descriptors: *Pulp wastes, Waste water(Pollution), Waste treatment, *Waste water treatment, *Coagulation, *Flocculation, Chemical precipitation, *Industrial water, *Recirculated water, Water conservation, *Polymers, *Polyelectrolytes, Microorganisms, Slime, Aluminum, Aquatic microorganisms, Bacteria, Fungi, Pulp and paper industry, Foreign research, Water reuse.
Identifiers: Aluminum sulfate, Polyacrylamide, White water, Board mills, Paper machines, Paper mills, Board machines, Closed systems.

Flocculants, such as aluminum sulfate, and coagulants, such as polyacrylamide, make it possible to clarify and reuse paper-machine white waters and, ultimately, to close the water circuits of paper and board mills, especially those producing coarser grades of papers and paperboards. The effect of

these two chemicals on micro-organism counts in purified mill effluents was investigated in laboratory tests. Board mill effluents sedimented without aid of chemicals contained large numbers of heterotrophic bacteria (1,400,000/ml) and of microscopic fungi (2,200/ml); these numbers increased rapidly during sedimentation. Addition of 180 mg aluminum sulfate 5 mg polyacrylamide per liter substantially reduced the counts of bacteria (by 62-99%) and of fungi (by 69-93%). This would indicate a minimization of slime deposit formation in case of recirculation of purified white water. (Stapinski-IPC)
W74-12961

PURIFICATION OF HYDROLYSIS PLANT EFFLUENTS FROM CARBOHYDRATES (OCHISTKA STOCHNYKH VOD GIDROLIZNYKH ZAVODOV OT UGLEVODOV),
E. E. Drublyanets, and N. A. Skachkova.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', No 1, p 4-5, 1974. 4 tab, 4 ref.

Descriptors: Waste treatment, *Carbohydrates, *Activated sludge, *Biodegradation, Microorganisms, *Industrial wastes, *Waste water treatment, Water analysis, *Chromatography, *Oxidation, *Hydrolysis, *Wood wastes, *Farm wastes.
Identifiers: Agricultural residues, Oligosaccharides, Arabinose, Monosaccharides, Uronic acids.

Carbohydrates (mono- and oligosaccharides and uronic acids) were identified and determined by chromatographic analysis in effluents from two Soviet hydrolysis plants, one processing wood wastes, the other agricultural residues, before and after activated sludge treatment. The biochemical treatment rapidly oxidized all carbohydrates except arabinose and its oligomers, which were not assimilated by the sludge microorganisms and only incompletely oxidized even under optimized treatment conditions. (Stapinski-IPC)
W74-12963

EFFLUENTS FROM WASTE PAPER STOCK CLEANING (SCIEKI PO OCZYSZCZANIU MASY MAKULATUROWEJ),
Instytut Celolozowo-Papierniczy, Warsaw (Poland).
For primary bibliographic entry see Field 5B.
W74-12972

PLANNING METHODOLOGY FOR THE DESIGN OF REGIONAL WASTE WATER TREATMENT SYSTEMS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
E. F. Joeres, J. Dressler, C-C. Cho, and C. H. Falkner.
Water Resources Research, Vol 10, No 4, p 643-649, August 1974. 9 fig, 1 tab, 16 ref.

Descriptors: *Waste water treatment, *Computer models, *Alternative planning, *Decision making, *Economies of scale, Optimization, Treatment facilities, Regional analysis, Methodology, Design, Pipes, Networks, Costs, Algorithms, Evaluation, Wisconsin, Equations, Mathematical models, Systems analysis.
Identifiers: *Cost minimization, *Mixed integer programming, Environmental impact.

A computer model is developed to select an optimal regional waste water treatment system, given prior definition of all reasonable interceptor routes connecting individual communities, local treatment plant sites, and associated maximum discharge potentials. The model considers the trade-off between economies of scale inherent in waste water treatment plants and added pipe network collection costs. Utilizing mixed integer programming, the model relies on piecewise linear approximations of concave cost curves and incorporates capacity limits dictated by maximum tolerable environmental impact at potential treatment plant sites. The objective is to minimize total regional cost while satisfying demands for waste water service, without violating the tolerable environmental impact limits. Pipe cost functions are assumed to be continuous as a function of flow, all generated waste water is assumed to be generated at point sources, and maximal capacities chosen for individual plant sites are based on a uniform treatment efficiency of 85%. Cost savings are found possible for the central region of Dane County, Wisconsin. (Bell-Cornell)
W74-13018

INDUSTRIAL ECONOMIC MODEL OF WATER USE AND WASTE TREATMENT FOR AMMONIA,
Houston Univ., Tex.
J. A. Calloway, A. K. Schwartz, Jr., and R. G. Thompson.
Water Resources Research, Vol 10, No 4, p 650-658, August 1974. 7 fig, 5 tab, 9 ref, 2 append. NSF GI-34459.

Descriptors: *Water quality control, *Industrial wastes, *Ammonia, *Water policy, *Waste treatment, *Linear programming, *Economics, Waste water treatment, Water utilization, Optimization, Costs, Effluents, Taxes, Standards, Marginal costs, Prices, Evaluation, Mathematical models, Systems analysis.
Identifiers: *Ammonia plants, Water withdrawal, Cost minimization.

A linear programming model is developed to evaluate the effects of different policies on: the production and treatment of dissolved and suspended solids produced by an ammonia plant; the use of water in ammonia production; and the cost of ammonia. Solution of the model for each specified policy yields the least-cost ammonia production process, the marginal costs of the resource limitations, and the cost of water use and waste water treatment. The effect of systematically decreasing each effluent standard to zero is evaluated, and the effect of increasing the water price on water withdrawals is determined. Results are: (1) zero discharges of suspended solids, heat, and total dissolved solids increased production costs 3.8% with injection wells; (2) an effluent tax of 3.6 cents/lb dissolved solids will reduce dissolved solid discharges 95%, and an effluent tax of 29.5 cents/lb dissolved solids will reduce the discharges 100%; (3) a water withdrawal price of 3.2 cents/1000 gal. will reduce water withdrawals 95%; and (4) zero discharge of residuals and high water prices increase production costs less than 4%. The modeling has been done for a newly designed plant; both naphtha and natural gas feedstocks were evaluated. (Bell-Cornell)
W74-13020

DYNAMIC ANALYSIS AND OPTIMAL FEEDBACK CONTROL SYNTHESIS APPLIED TO BIOLOGICAL WASTE TREATMENT,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
L. T. Fan, P. S. Shah, N. C. Pereira, and L. E. Erickson.
Water Research, Vol 7, No 11, p 1609-1641, November 1973. 16 fig, 49 ref, 2 append.

Descriptors: *Water quality control, *Waste treatment, *Biological treatment, *Effluents, *Model studies, Control, Optimization, Computers, Simulation analysis, Algorithms, Equations, Operations research.
Identifiers: *Feedback control, Kinetic models, Flow models, Influent flow rate, Substrate concentration, Material balance.

The dynamics and optimal feedback control of biological waste treatment processes are examined. Modern feedback control theory is applied and results are obtained for both proportional and proportional plus integral control. A dynamic mathematical model of the system is developed by using a Monod kinetic model, which is modified to account for endogenous metabolism, and a complete mixing flow model in the growth chamber. Extensive computer simulations are used to gain a thorough knowledge of the system's responses to external disturbances or to changes in the system's operation. The feedback control is implemented via the flow rate so as to maintain desired effluent concentrations. External disturbances causing changes in substrate concentration and/or cell concentration are considered and optimal control effort is applied. Results are also presented for impulse and step changes in the influent substrate concentration. By changing the values of the weighting factors in the objective function, it is possible to obtain good control of either the effluent substrate concentration or cell concentration. (Bell-Cornell)
W74-13026

FLOW-MEASURING FLUME FOR WASTEWATER FOR TREATMENT PLANTS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
W. R. Walker, G. V. Skogerboe, and R. S. Bennett.
J Water Pollut Control Fed. Vol 45, No 3, Part 1 p 542-551, 1972. Illus.

Descriptors: *Flumes, *Waste water treatment, Water measurement, Flow measurement.
Identifiers: Cut-throat flume.

A flat-bottomed, rectangular cut-throat flume can be used successfully in wastewater treatment plants. Generalized ratings for the structure based on a comprehensive flow analysis technique were devised. These allow a broad flexibility in design. The cut-throat flume has numerous advantages over traditional flow measuring devices, such as low fabrication costs, adaptability in existing facilities, upstream velocity control characteristics and acceptable measuring accuracy in either the subcritical or supercritical flow regime. A theoretical basis for a self-compensating recording system for recording flows in the subcritical condition is given with specific application to the cut-throat flume.--Copyright 1973, Biological Abstracts, Inc.
W74-13032

EPIZOIC ALGAE IN SEWAGE WATERS, (IN RUSSIAN),
Kharkov State Univ. (USSR).
For primary bibliographic entry see Field 5B.
W74-13041

OPTIMAL REGIONALIZATION OF WASTEWATER TREATMENT FOR WATER QUALITY MANAGEMENT,
Illinois Univ., Urbana. Dept. of Civil Engineering.
L. A. Rossman, and J. C. Liebman.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 41($7.00 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No 89, July 1974. 198 p, 12 tab, 26 fig, 66 ref, 2 append. OWRT A-063-ILL(1), 14-31-0001-4013.

Descriptors: *Waste water treatment *Mathematical models, Water quality *Optimization, *Regional analysis, Costs, Treatment facilities, Model studies, Piping systems(Mechanical), Cost analysis.
Identifiers: Regional systems, *Cost minimization Nonlinear programming.

A mathematical decision model is developed which determines how a group of waste dischargers should regionalize their treatment facilities and the amount of treatment each facility should provide so that the cost of achieving a specified water quality goal is minimized. The wastedischargers are assumed to lie in a linear configuration along (or on both sides of) the river and several other regionalization restrictions are im

posed. Treatment plant and piping costs as functions of wasteflow can be of any form and may include fixed costs. The model is solved by using a dual approach to nonlinear programming and is applied to data from the Delaware Estuary. The results compare favorably with previous regionalization shemes. The model is extended to consider branched systems and the use of bypass piping. Two additional minimum cost, regional wastewater treatment models are developed; one which finds the regional treatment facility pattern when degree of treatment is fixed and another which finds the regional facility pattern and uniform level of treatment for all facilities so that a water quality goal is met.
W74-13048

CONCENTRATION OF INDUSTRIAL WASTE BY DIRECT OSMOSIS,
Rhode Island Univ., Kingston. Dept. of Chemical Engineering.
F. Votta, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-236 468 $3.25 paper copy, $2.25 in microfiche. Completion Report, July 1974. 15 p, 3 tab, 12 ref. OWRT A-049-RI(1). 14-31-0001-4040.

Descriptors: *Osmosis, *Industrial wastes, *Feasibility studies, *Waste water treatment, *Membrane processes, Penetration, Permeability, Reverse osmosis.

A study has been made of the feasibility of using direct osmosis at atmospheric pressure as a means of concentrating dilute industrial wastes. Waste solutions were concentrated by the permeation of water through an osmotic membrane to sea water, whose osmotic pressure was less than that of the waste solutions. None of the commercially available reverse osmosis membranes tested were found suitable. The water permeation rates were low, less than 3 gal/sq.ft./day, and the salt rejection was poor. The concentrated waste solutions were contaminated by an appreciable quantity of sodium chloride and relatively large quantities of metallic ions were lost in the diluted sea water during the concentration of metallic waste solutions.
W74-13055

CONDITIONS FOR DISCHARGE INTO A BODY OF WATER OF PROMETRINE PRODUCTION EFFLUENTS, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Institut (USSR). Dept. of Public Hygiene.
L. N. Gabrilevskaya, and V. P. Laskina.
Gig Sanit. Vol 37, No 3, p 18-21, 1972, English summary.
Identifiers: *Prometrine, Sewage, Propazine, Sodium methylmercaptide, Sodium methylsulfonate, *Waste water treatment.

The composition of the effluents was studied and hygienic substantiation was made of the maximal permissible concentration of specific ingredients of this liquid (prometrine, propazine, sodium methylmercaptide, sodium methylsulfonate). Comparative features are noted of effluents before and after their treatment by the chemical process suggested by the enterprise. The suggested method of treatment of the discharged waters was unfit for widespread use.--Copyright 1973, Biological Abstracts, Inc.
W74-13065

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
R. P. Monti, and P. T. Silbermann.
Water and Wastes Engineering, Vol 11, No 3, p 32-36, March, 1974. 5 fig.

Descriptors: *Water quality standards, *Waste disposal, *Waste water treatment, *Waste treatment, Water treatment, Waste dilution, Sewage treatment, Activated carbon, Waste water, Water pollution, Water quality, Adsorption, Industrial wastes, Municipal wastes, Standards, Pollution abatement.
Identifiers: *Biological treatment, *Physical-chemical treatment, EPA standards(1977), Pollution control deadlines.

This first article of a four-part series outlines wastewater techniques which could be used to cope with the 1977, 1983, and 1985 federal pollution control deadlines. By 1977, publicly-owned waste treatment facilities must discharge effluent equal to or better than secondary treatment standards specified by EPA. Secondary treatment can be achieved through biological and physical-chemical (p-c) methods, but p-c treatment has gained favor recently, especially chemical precipitation and settling, filtration, and for higher treatment, activated carbon adsorption. P-c plants seem to be more reliable and their effluent is more uniform that that from biological plants, since chemical processes are more predictable than biological ones. Energy requirements are also less for p-c plants since aeration equipment is not used. However, p-c plants have higher operating costs because of large chemical and activated carbon costs, and their sludges pose a greater disposal problem because of the chemical content. P-c plants do not remove major wastewater components such as ammonia, and it is questionable whether wastewater should be treated with chemicals when the same treatment levels can be attained biologically, with oxygen. (See also W74-10290 and W74-13072) (Grden-North Carolina)
W74-13071

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
R. P. Monti, and P. T. Silbermann.
Water and Wastes Engineering, Vol 11, No 6, p 52-56, June, 1974. 1 tab, 3 fig.

Descriptors: *Demineralization, *Water quality standards, *Ion exchange, *Reverse osmosis, *Waste water treatment, Waste disposal, Waste treatment, Water treatment, Waste dilution, Waste water, Water pollution, Water quality, Standards, Pollution abatement, Municipal wastes, Industrial wastes, Water purification, Distillation.
Identifiers: *Pollution control deadlines, EPA standards(1985).

Federal law specifies that by 1985, there must be zero discharge of pollutants, and this final article of a four-part series discusses methods for attaining that standard. Demineralization of wastewater has been practiced for years by a technique utilizing a positive and negative ion exchange process. While this process has an 85 to 95% efficiency or higher, it does generate a considerable amount of waste brines with high mineral content that are difficult to dispose of. This method is also costly, and it is doubtful that any new technology will lower the costs. Reverse osmosis (RO) is presented as a more feasible alternative, and it can remove 85 to 90% of dissolved minerals in wastewater. Its development is in the infancy stage, so its operation will probably become more efficient and costs will decrease. The RO process can also tolerate higher organic wastewater loadings than can ion exchange without experiencing operating problems. In situations where ultrapure water approaching distilled water is required, a system including RO and ion exchange appears to be feasible, and the combined demineralization efficiency would be greater than 98%. (See also W74-13071) (Grden-North Carolina)
W74-13072

QUARTERLY PROGRESS REPORT STUDIES ON MANAGEMENT OF SELECTED WASTES - JANUARY THROUGH MARCH 1974.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
Available from NTIS, Springfield, Va., 22161, as BNWL-1825, $4.25/copy; $2.25 microfiche. Report No. BNWL-1825, April 1974. 58 p, 7 fig, 14 tab, 15 ref.

Descriptors: *Management, *Waste treatment, *Radioactive waste disposal, *Research and development, Water pollution treatment, Analytical techniques, Solvent extractions, Tritium, Reviews.

Progress is reported on decontamination and densification of chop leach cladding residues. A literature review of aqueous, molten salt, and melt flux decontamination processes has indicated that waste stream minimization, ease of operation, and decontamination efficiency can probably be optimized by a modified aqueous decontamination process followed by melting. The reuse of metal from decontamination would be possible after long cooling times. Studies on waste treatment and handling processes continued. Equipment required for scoping studies on pyrolysis of wastes was fabricated and installed. Experimental plans for the scoping studies were completed and experiments at 700C using six different waste components were conducted. Solvent extraction studies have shown that competitive factors negate most of the separation which might be expected. A few studies are continuing using strongly basic solvents. Tritium separation and fixation continue to offer problems. (See also W74-13107 thru W74-13109) (Houser-ORNL)
W74-13106

DECONTAMINATION AND DENSIFICATION OF CHOP-LEACH CLADDING RESIDUES,
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
R. L. Dillon, and R. S. Kemper.
In Report No. BNWL-1825, p 3-18, April 1974. 7 tab, 11 ref.

Descriptors: *Management, *Radioactive waste disposal, *Waste treatment, *Solids, Fuels, Alloys, Metals, Absorption, Tritium, Nuclear power plants.

Fuel element cladding residues from the chop-leach head end process constitute a low density, high surface area metallic waste with a substantial actinide element contamination. The objective of this study is to determine the feasibility of and to develop method for removal of long half-life transuranics from the cladding residues and for consolidation of the zirconium and stainless steel residues. The study involves: (1) Selection and laboratory testing of methods for transuranic removal. (2) Consolidation of the fuel element hulls by melting and casting Zircaloy, stainless steel, Inconel or alloys of the three. (3) Testing and evaluating the consolidated fuel hulls for long-term waste management. (4) Absorption and fixation of tritium into the waste ingots. (5) Consolidation of transuranics removed. (See also W74-13106) (Houser-ORNL)
W74-13107

WASTE TREATMENT AND HANDLING PROCESSES,
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
V. L. Hammond.
In Report No. BNWL-1825, p 19-35, April 1974. 7 fig, 5 tab.

Descriptors: Research and development, Management, *Radioactive waste disposal, *Solid wastes, *Waste treatment, Waste storage, Assessment, Safety, Evaluation, Nuclear powerplants.
Identifiers: *Alpha wastes, Low-level wastes, Pyrolysis.

The principal objective is to evaluate current practice and to develop alternative processes for safe and economical volume reduction of low-level contaminated solid wastes (alpha wastes) from 10- to 50-fold as a precursor to long-term storage and/or disposal. This objective will be pursued via (1) a phased program of bench-scale research activities leading to and supporting experimental-facility development activities; and (2) by systematic and continuing analytical studies to assess developments in current practice for alternative, candidate techniques for processing alpha wastes prior to long-term storage and/or disposal. The experimental program will initially emphasize pyrolysis as a means for reducing the volume (and weight) of combustible solid wastes. (See also W74-13106) (Houser-ORNL)
W74-13108

TRITIUM SEPARATION AND FIXATION,
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
L. L. Burger.
In Report No. BNWL-1825, p 36-44, April 1974. 2 tab, 4 ref.

Descriptors: *Research and development, *Radioactive waste disposal, *Tritium, *Analytical techniques, *Solvent extractions, Separation techniques, Assay, Assessment, Evaluation.
Identifiers: *Fixation, *Molecular excitation, Concentration.

The objectives are to identify potential tritium separations methods and methods of fixing the tritium in forms suitable for storage. The separations study aims to calculate separative work and costs in terms of separation parameters to identify overall separation needs. Solvent extraction, molecular excitation, and other techniques that appear attractive are to be evaluated in experimental tests. The fixation study will define the concentrations and amounts of tritiated water wastes and examine methods of immobilizing HTO for permanent storage. (See also W74-13106) (Houser-ORNL)
W74-13109

RELEASES OF RADIOACTIVITY IN EFFLUENTS AND SOLID WASTE FROM NUCLEAR POWER PLANTS IN 1972.
Oak Ridge National Lab., Tenn. Nuclear Safety Information Center.
For primary bibliographic entry see Field 5B.
W74-13125

EFFLUENT CONTROL IN FUEL REPROCESSING PLANTS,
Oak Ridge National Lab., Tenn.
O. O. Yarbro, F. E. Harrington, and D. S. Joy.
Available from USAEC Tech. Inf. Center, Oak Ridge, Tenn., $5.45/copy, $2.25/microfiche. Report No ORNL-TM-3899, March 1974. 64 p, 4 fig, 13 tab, 3 ref, append.

Descriptors: *Management, *Nuclear powerplants, *Fuels, *Effluents, Technology, *Waste treatment, Control systems, Wastes, Ventilation, Environment, Safety, Research and development, Tritium, Krypton, Iodine, Model studies.
Identifiers: *Fuel reprocessing, Containment.

Summarized is a study of how extrapolations of current and developing technology might be applied to the task of reducing radioactive effluents from future fuel reprocessing plants to 'near zero.' The study has indicated that very significant reductions of effluents can be achieved by integrating advanced effluent control systems with new concepts of containment and ventilation that would reduce net inleakage of air to the process enclosures and provide for extensive recycle of gases and liquids. If net plant effluent flow rates can be thus reduced and if the highly efficient fission product removal systems, under development, become available, it should be possible to reduce the discharge of activity to the environment in future plants by four to six orders of magnitude. (Houser-ORNL)
W74-13127

CHEMICAL ENGINEERING DIVISION WASTE MANAGEMENT PROGRAMS QUARTERLY REPORT, OCTOBER-DECEMBER 1973,
Argonne National Lab., Ill.
M. J. Steindler, N. M. Levitz, L. E. Trevorrow, T. J. Gerding, and B. J. Kullen.
Available from NTIS, Springfield, Va. 22161 as ANL-8087, $3.75/copy, $2.25/microfiche. Report No ANL-8087, February 1974. 45 p, 3 fig, 7 tab, 144 ref, append.

Descriptors: *Management, *Nuclear wastes, *Waste treatment, *Evaluation, Osmosis, Membrane processes, Separation techniques, Plutonium, Tritium, Compressibility, Pressure, Research, *Reverse osmosis.
Identifiers: *Fuel reprocessing wastes.

Metal-compaction methods have been reviewed and information on the irradiation-induced property changes of Zircaloy surveyed as part of a study on the handling of fuel cladding hulls. Information originating from AEC-site visits and from a review of the open literature concerning decontamination of plutonium-contaminated materials is presented. The technical and economic feasibility of adapting reverse osmosis to the concentration of tritium from tritiated fuel reprocessing wastes was briefly evaluated. Technical feasibility was assumed from literature reports of a difference of about 3% in the self-diffusion coefficients of THO and water, and possibly greater differences in transport rates in solution-diffusion membranes. The costs of such a process were calculated from (1) estimates for the single-stage separation factor, (2) the heads flow rate for assumed concentrations and volumes of feed, product, and waste in an ideal cascade of membranes, and (3) published costs for reverse osmosis equipment. (Houser-ORNL)
W74-13128

AQUEOUS PROCESSING OF LMFBR FUELS TECHNICAL ASSESSMENT AND EXPERIMENTAL PROGRAM DEFINITION SECTION 4.4 AND 5.4.
Oak Ridge National Lab., Tenn.
Available from NTIS, Springfield, Va, as ORNL-4436 (Suppl 1), $3.75/copy, $2.25/microfiche. Report No ORNL-4436, Supplement 1, June 1972. J. H. Goode and S. D. Clinton, Compilers. 48 p, 3 fig, 105 ref.

Descriptors: *Radioactive waste disposal, *Separation techniques, *Solutions(Aqueous), *Volatility, *Gases, Tritium, Iodine, Xenon, Krypton, Fuels, Waste storage, Waste treatment.

Investigations are described into a new head-end processing step that has the potential of removing volatile fission products as gases prior to aqueous processing. The objective of this step, which has been termed 'voloxidation,' is to volatile and remove tritium, iodine, xenon, and krypton from the sheared fuel and blanket materials for trapping and ultimate storage as wastes. Conceivably, this objective may be realized by heating the sheared fuel matrix to 750C or less in air or oxygen to release the volatile fission products via thermal evalution or chemical reaction. The gases are then carried out of the voloxidizer unit for subsequent trapping and retention within the plant. At this time, the major emphasis is on the removal of tritium from U02 and U02-Pu02 fuels, since this fission product would otherwise be irretrievably diluted into the aqueous streams during dissolution of the fuel. (Houser-ORNL)
W74-13131

QUARTERLY PROGRESS REPORT - RESEARCH AND DEVELOPMENT ACTIVITIES, WASTE FIXATION PROGRAM, JANUARY THROUGH MARCH 1974.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
Available from NTIS, Springfield, Va, as BNWL-1826, $4.75/copy, $2.25/microfiche. Report No BNWL-1826, April 1974. J. L. McElroy, Compiler. 77 p, 16 fig, 14 tab.

Descriptors: *Research and development, *Management, *Nuclear wastes, *Waste disposal, *Waste treatment, Waste storage, Tritium, Water vapor, Hydrogen, Gases, Leaching, Research facilities, Solvent extractions.
Identifiers: *Waste fixation, Waste calcination.

Six runs were completed with the spray calciner and Inconel melter. In one run, where ruthenium volatilization was followed, about 2.4% of the feed ruthenium was observed in the calciner-melter condensate and none in the caustic scrubber solution or downstream gas samples. In the sixth run, DSS-15, a 510-hour run was completed in which 11,300 liters of PW-4b feed were calcined and 2.4 metric tons of borosilicate glass were produced. Data from this run are still being analyzed. Development of the ceramic electrode heated melter was continued. Studies continued on the inconel metallic melter for handling high level waste; progress is reported in the glass leach rate effort; research continues on waste calcination and product gases. A comprehensive safety and systems evaluation for the definition and investigation of nuclear waste management systems is well underway. (Houser-ORNL)
W74-13132

DETERMINATION OF TRITIUM IN WASTE PROCESSING EFFLUENTS BY DISTILLATION AND LIQUID SCINTILLATION EMULSION COUNTING,
Atlantic Richfield Hanford Co., Richland, Wash. Manufacturing and Waste Management Div.
For primary bibliographic entry see Field 5A.
W74-13134

TECHNICAL AND SOCIAL ASPECTS OF NUCLEAR WASTE DISPOSAL IN WESTERN EUROPE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
D. J. Rose, and G. Tenaglia.
AMBIO, Vol 2, No 6, p 233-240, 1973. 3 fig, 11 ref.

Descriptors: *Radioactive waste disposal, Technology, *Methodology, *Social aspects, Strontium, Cesium, Plutonium, Americium, Uranium, Nuclear powerplants, Fuels, Hazards, Analysis, Effluents, Nuclear energy, Economics, Waste storage, Public health.
Identifiers: *Actinides, *Fuel reprocessing.

Useful new technical options for preparing and treating nuclear wastes seem available. But even so, the shortest time needed for safe storage of radioactive wastes such as fission products will be at least 700 years. The key issues of the problem are the moral responsibility of reducing risks to present and future generations, and the longevity of human institutions. The basic responsibility for the disposal of high level nuclear wastes should rest with the nations rather than with international organizations, as nations have a greater continuity in time. Two proposals offered for disposal, though impractical for the present but bear watching, are transport into the sun and nuclear transmutation of radioactive wastes. The best remaining options seem to be retrievable surface storage and permanent disposal by sealing in stable impervious geologic formations. (Houser-ORNL)
W74-13135

IYGIENIC EVALUATION OF POLYMERS ISED IN THE MEMBRANE METHODS OF VATER DESALINATION (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Selskoi Gigieny, USSR).
. V. Shtannikov, G. I. Rozhnov, A. M. Akimov, . B. Aksenova, and B. M. Khonin.
ig Sanit. Vol 37, No 4, p 23-25. 1972. English ummary.
dentifiers: Embryo, *Membranes, Polymers, Toxicity, *Desalination, *Waste water treatment.

he heterogenic membrane MA-4 (an artificial embrane made of polethylene and anion xchanger) inparts a smell to water. The mem-rane MA-41 discharges unlimited substances into ie water extract. The tested samples of acetylcel-ilose membrane had no pronounced effect on the roperties of water. The investigated substances ere weakly cytotoxic in rats. The acetylcellulose embrane was embryotoxic.--Copyright 1974, iological Abstracts, Inc.
/74-13159

ITROGEN TRANSFORMATIONS AND VAILABILITY OF AN ANAEROBICALLY IGESTED SEWAGE SLUDGE IN SOIL,
Visconsin Univ., Madison. Dept. of Soil Science.
or primary bibliographic entry see Field 5B.
/74-13163

OLUBILIZATION OF HYDROCARBONS BY HE DISSOLVED ORGANIC MATTER IN SEA VATER,
hode Island Univ., Kingston. Graduate School of)ceanography.
. D. Boehm, and J. G. Quinn.
eochim Cosmochim Acta. Vol 37, No 11, p 2459-477. 1973. Illus.

)escriptors: *Pollutants, *Solubility, *Fulvic cids, Acids, *Organic compounds, Water pollu-on, Estuaries, Effluents, Wastes, Water pollu-on sources, *Sewage effluents, Chemical analy-is, Fuels, Oil, Sea water, *Waste water treat-ient, Waste water disposal, Sediment transport, Rhode Island.
dentifiers: Micelles.

Vater samples from Narragansett Bay and the rovidence River, and fulvic acid/saline water olutions were examined for their ability to solu-ilize n-alkane (n-C16 and n-C20), isoprenoid ristane) and aromatic (phenanthrene and nthracene) hydrocarbons and dibutyl phthalate. emoval of the dissolved organic matter (DOM) rom the natural samples by activated charcoal nd by UV oxidation resulted in a 50-99% decrease n the amounts of n-alkanes and isoprenoid ydrocarbons solubilized. This decrease was irectly related to the amount of DOM removed. he solubilities of the aromatic hydrocarbons ere unaffected by the DOM. Fulvic acid from a arine sediment, surface active organic material olated at a chloroform/sea water interface, or-anic material extracted from a marine sediment y sea water, and organic matter contributed by a unicipal sewage effluent, promote n-alkane solu-ility when added to NaCl solutions and re-nhance solubility when added to organic depleted ea water. The solubility of Number 2 fuel oil in-reased 2.5 times in the presence of fulvic acid (3.7 g C/l) with most of the increase seen in the al-ane and isoprenoid components. N-Alkane solu-ility increases in fulvic acid/saline water solu-ons with increasing pH and reaches a maximum ith respect to ionic strength at I = 0.3. The mode f solubilization of the hydrocarbons may be by ncorporation into micelles formed by inter-olecular association of the surface active humic-ype monomers. The presence of ionic species is a rerequisite for micelle formation. (These findings ave implications for the fate of hydrophobic pol-utants in estuarine and coastal areas and the ef-ect of municipal sewage effluents on the transport f these pollutants).--Copyright 1974, Biological bstracts, Inc.
W74-13166

HYDROLOGIC PERSPECTIVE OF SURFICIAL WASTE DISPOSAL,
Geological Survey, Tampa, Fla.
J. W. Stewart, A. D. Duerr, C. B. Hutchinson, J. J. Hickey, and D. P. Brown.
Field Trip Guide for Symposium held in Tampa, Florida, April 16-18, 1974. 36 p, 15 fig.

Descriptors: *Waste water disposal, *Waste disposal, *Landfills, *Sprinkler irrigation, *Florida, Municipal wastes, Sewage treatment, Waste water treatment, Conferences.
Identifiers: *Tampa(Fla).

A field trip was held in Tampa, Florida to study the effects of disposal of wastes on the surface. The Eureka Springs site in the eastern part of the county requires extensive dewatering in order to maintain landfilling operations. The development of the Toytown landfill has resulted in substantial stresses on the water-table aquifer system. Under natural conditions, the land is poorly drained, and the water table is near land surface. Quality of water within a 4-mile radius is monitored by means of 39 wells completed in the surficial aquifer, 41 wells completed in the Floridan aquifer and 14 surface-water stations at ponds and drainage canals. A 50-acre tract is used as an experimental sod farm to evaluate the feasibility of the spray method for sludge disposal. In another study, spray irrigation is being tested for disposal of the effluent from a secondary-treatment plant. Peninsular Pinellas County is faced with major problems in meeting pollution-control aims of zero dishcarge. In some areas of the county, land spreading is probably not a practical alternative for large volumes of effluent. The county's new system contains a waste-treatment plant, storage pond, an underdrained spray-irrigation area, a furrow-irrigation area, and two deep waste-water injection wells. At Innisbrook, a condominium-resort complex, spray-irrigation is presently part of the waste-treatment system. Spray irrigation of a pasture with waste-treatment plant effluent has also been in progress for about 5 years at the United Brotherhood of Carpenters and Joiners of America Home. The low rate of application has caused only minor apparent changes in water quality. (Knapp-USGS)
W74-13210

INTERIM EFFLUENT GUIDANCE FOR NPDES PERMITS,
Environmental Protection Agency, Washington, D.C. Permit Program Div.
For primary bibliographic entry see Field 5G.
W74-13214

THE EFFECT OF PHENOLS AND HETEROCYCLIC BASES ON NITRIFICATION IN ACTIVATED SLUDGES,
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Microbiology.
D. A. Stafford.
Journal of Applied Bacteriology, Vol 37, No 1, p 75-82, 1974. 7 fig, 1 tab, 9 ref.

Descriptors: *Activated sludge, *Phenols, *Nitrification, *Suspended solids, Temperature, Ammonia, Oxidation, Mathematical models, *Waste water treatment, Water pollution effects.
Identifiers: Ammonia oxidation, Nitrite oxidation, *Heterocyclic bases.

The optimum conditions of pH, suspended solids concentration, temperature and age of sludge, for nitrification by activated sludge have been studied. Activated sludge receiving ammonium thiocyanate (500 mg/liter) was able to nitrify. The rate of ammonia oxidation was decreased when less than 3 mg/liter of phenol (or cresols) was added to the sludge, and at 10 mg/liter was inhibited completely. Concentrations of up to 100 mg/liter of phenols did not affect nitrite oxidation. The 2- and 4-methyl pyridine derivatives inhibited both ammonia and nitrite oxidation. (Prague-FIRL)
W74-13235

SANITARY-VIROLOGICAL CHARACTERIZATION OF SEWAGE WATERS FROM SOME URBAN SEWAGE SYSTEMS IN THE UZBEK SSR, (IN RUSSIAN),
Uzbesksii Nauchno-Issledovatelskii Institut Sanitarii, Gigieny i Profzabolevanii, Tashkent (USSR).
For primary bibliographic entry see Field 5A.
W74-13241

OIL/WATER SEPARATION ACCELERATION MEDIA,
Oil Mop, Inc., New Orleans, (assignes).
For primary bibliographic entry see Field 5G.
W74-13243

FLUID SEPARATION APPARATUS AND MEMBRANE SUPPORT FRAMES THEREFOR,
G. Niogret.
United States Patent 3,809,246. Issued May 7, 1974. Official Gazette of the United States Patent Office, Vol 922, No 1, p 179, May, 1974. 1 fig.

Descriptors: *Separation techniques, *Patents, *Membranes, Liquids, Equipment, Waste disposal, Liquid wastes, *Waste water treatment.
Identifiers: *Fluid Separation.

A fluid separating apparatus has a support frame for placement between the membranes. The frame comprises a generally rectangular plate, with two faces and two ends. At least one cell forming a recess is formed in each face, and at least one orifice extends through the thickness of the plate adjacent to the ends of the plate for the passage of fluid to be treated. A duct exists for the removal of fluid which is passed through the membrane supported by the plate over each of the cells forming recesses. An aperture passes through the plate and is positioned between at least one of the orifices and the cell forming recess. The aperture has a detachable clamp to clamp membranes disposed on each of the faces in a fluid-tight manner against a rules surface of the rectangular plate. (Prague-FIRL)
W74-13244

FUEL SEDIMENT BOWL ASSEMBLY,
Deere and Co., Moline, Ill. (assignes)
J. E. Jackson.

Descriptors: *Patents, *Fuel, Pumping, Sediment, *Separation techniques, Equipment , Valves, *Waste water treatment.
Identifiers: *Fuel sediment bowl assembly, Fuel pumps, Valving.

A fuel sediment bowl assembly is described. The assembly is built between a source of fuel and a fuel pump. A hand pump cooperates with appropriate valvaing for pumping fuel into the sediment bowl when separated water in the bowl is being drained. The action of the pump effects the replacement of the volume formerly occupied by the water by fuel such that no air will be introduced into the system. The sediment bowl assembly also includes a baffle at the top. This aids in the separation of water from the fuel which is drawn through. (Prague-FIRL)
W74-13245

ROTARY COUNTERCURRENT SOLID-LIQUID EXTRACTION APPARATUS,
Raffinerie Tirlemontoise, Brussels (Belgium). (assignes)
G. F. Duchateau.
United States Patent 3,809,538. Issued May 7, 1974. Official Gazette of the United States Patent Office, Vol 922, No 1, p 255, May, 1974. 1 fig.

Descriptors: *Patents, Extraction, Liquids, Solids, Equipment, *Waste water treatment, Flow, *Solvent extractions.
Identifiers: *Rotary countercurrent apparatus, *Solid/liquid extraction, Liquid fraction, Solids fraction.

A method was designed for extracting, by means of a liquid, products which are part of solids in a partitioned rotating extractor. The flow of the liquid fraction, separated from the solids fraction, is slowed down by baffles and the liquid fraction is spread over the length and width relative to the new solids fraction. (Prague-FIRL)
W74-13247

DEVICE FOR REMOVING A SLUDGE FROM A SURFACE,
Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo (Japan). (assignee)
K. Shibata, Y. Seika, I. Sakamoto, K. Yamada, and S. Kondon.
United States Patent 3,808,631. Issued May 7, 1974. Official Gazette of the United States Patent Office, Vol 922, No 1, p 21, May, 1974. 1 fig.

Descriptors: *Patents, *Sludge treatment, *Jets, Liquids, Slurries, *Waste water treatment, Conduits, Liquid wastes.
Identifiers: *Sludge removal, Shovel.

A device for removing a sludge from the surface of a liquid or from a floor such as a deck of a tanker is described. This includes a shovel which is adapted to be moved along the sludge with its opened mouth positioned to receive the sludge. The construction includes a connection for directing a high velocity liquid jet into the shovel in the vicinity of the mouth to impinge upon the sludge and to break it up into a slurry. In addition, means are provided for withdrawing the slurry upward through a conduit for discharge at a remote location. The discharging connection consists of a liquid ejector which is operated partly be the conduit connected for supplying the high velocity jet of liquid to the shovel. This is connected to the shovel for providing a withdrawing suction or pumping action on the slurry which forms in the shovel. In a further embodiment, the interior of the shovel is provided with a screen or grate across the shovel interior onto which the slurry is directed and against which the high velocity liquid jet is directed. The action breaks up the slurry elements into finer elements for withdrawal through the discharge conduit. A still further embodiment includes an intermediate chamber at the rear of the shovel and a plurality of turning water streams. These are directed in a whirling flow to cause a rotation and further pulverizing of the slurry material before it is delivered through the discharge conduit. (Prague-FIRL)
W74-13249

PURIFICATION PROCESS,
North Western Gas Board, Rochdale (England). (assignee)
T. Nicklin.
United States Patent 3,810,833. Issued May 14, 1974. Official Gazette of the United States Patent Office, Vol 922, No 2, p 593, May, 1974.

Descriptors: *Patents, Effluents, *Salts, Liquids, Hydrocarbons, Gases, Ion exchange, Removal, *Water purification, *Waste water treatment.
Identifiers: *Fuel gasses, *Vanadium compounds, Sodium anthraquinone disulphonates, Effluent liquors, Adsorbent beds.

An effluent purification process was patented for removing vanadium salts, sodium anthraquinone disulphonates and di-hydroxyanthraquinones from effluent liquors which have been used in processes for removing hydrogen sulphide from fuel gases or liquid hydrocarbons. The process comprises passing the liquor through an adsorbent bed to remove the anthraquinone compounds and through an ion exchange material to remove the vanadium compounds. (Prague-FIRL)
W74-13250

FLOATING APPARATUS FOR LIQUID COMPOSTING,
Fairfield Engineering and Mfg. Co., Iowa. (assignee).
R. S. Blough.
United States Patent 3,810,548. Issued May 14, 1974. Official Gazette of the United States Patent Office, Vol 922, No 2, p 523-524, May, 1974. 1 fig.

Descriptors: *Patents, *Animal wastes, Liquid wastes, *Equipment, *Aeration, Flotation, *Waste water treatment, Circulation, Reservoirs.
Identifiers: *Liquid composting equipment, Floating apparatus.

A floating apparatus for aerating and circulating animal waste material was designed for use preferably in a relatively deep reservoir. This liquid composting equipment is comprised of an outer float assembly for floating support of the apparatus on the surface of the material in the reservoir; a rotatable hollow shaft extending down into the material, the lower end being adapted to permit air to exit; an axial thrust propeller rigidly attached to the lower end of the shaft; and a drive means for rotating the shaft and propeller to draw air down out of the lower end of the shaft to generate small bubbles, which are propelled into the material. The apparatus also has a barrier including a hollow cylinder concentrically surrounding the drive means and shutting off the supply of air at the upper end of the hollow shaft. (Prague-FIRL)
W74-13253

DREDGE AND SLUDGE ALEMBIC,
G. S. Kiss.
United States Patent 3,810,549. Issued May 14, 1974. Official Gazette of the United States Patent Office, Vol 922, No 2, p 524, May, 1974. 1 fig.

Descriptors: *Patents, *Dredging, Tanks, Settling, Screens, Slurries, *Waste water treatment, *Sludge treatment.
Identifiers: *Sludge alembic.

A sludge alembic is comprised of a sludge receiving tank with vibratory means in its interior for settling out the sludge solids or residue, and a screen means through which discharged water must flow. This alembic, which may be stationary, portable, or mounted on a barge or dredge, permits the location of a conveyor means beneath it for transporting slurry. The unit is called a combination dredge and sludge alembic. (Prague-FIRL)
W74-13254

TREATMENT OF WATER OR AQUEOUS SYSTEMS,
Ciba-Geigy Corp., Ardsley, N.Y. (assignee)
T. I. Jones, N. Richardson, and A. Harris.
United States Patent 3,810,834. Issued May 14, 1974. Official Gazette of the United States Patent Office, Vol 922, No 2, p 593, May, 1974.

Descriptors: *Patents, *Water treatment, *Metals, *Salts, *Waste water treatment.
Identifiers: Insoluble salts, Dissolved metal salts, *Hydrolysed polymaleic anhydride, Aqueous systems.

Hydrolyzed polymaleic anhydride is used for the treatment of water or aqueous systems containing dissolved salts of metals. This serves two functions: to cut down the rate at which insoluble salts are formed; and to modify their nature. (Prague-FIRL)
W74-13256

ENVIRONMENTAL CONTROL EQUIPMENT.
Hitachi Review, Vol 23, No 4, p 188-191, 1974.

Descriptors: *Equipment, *Environmental control, *Pollution abatement, *Waste water treatment, Tertiary treatment, Treatment facilities, Air pollution, Waste treatment.

Major technical achievements in 1973 in the field of atmospheric pollution control include an electric precipitator for utility boilers burning heavy fuel oil and crude oil, a large-capacity electric precipitator for industrial plants, and various dust collectors. Hitachi's contributions to water pollution prevention include a total system for waste water treatment, supplied to a power station, where it is in satisfactory operation. For general industrial waste water, facilities were developed for advanced treatment of machine works waste water by the activated carbon process and for electrolytic treatment of high-polymer effluents. In the field of industrial waste treatment, improvements included a sludge incinerator combining a centrifugal membrane evaporator and a dewatering device. In addition, Hitachi developed a new sludge incineration system in which coal power is mixed in undigested sludge, which is directly burned in a fluidized bed of an activated catalyst. Another invention is the sludge dryer by an infrared ray heater. Features of this equipment are detailed. (Sandoski-FIRL)
W74-13263

IRON: A TWO-EDGED SWORD.
Water and Pollution Control, Vol 112, No 5, p 26-27, May, 1974.

Descriptors: *Iron, *Water quality control, *Industries, *Waste water treatment, Chlorine, Ozone.
Identifiers: *Treatment methods.

Iron in water has an unpleasant connotation for municipal, industrial and domestic situations, with the chief concern of municipalities being the limitation of iron concentration below required guidelines. However, industry quality control personnel have the greatest incentive in keeping iron problems to a minimum, due to unsaleable commodities if an excess of ferric ions are present. Various chemicals and treatment methods used in removing iron and maintaining water qualoty control are outlined. (Sandoski-FIRL)
W74-13267

EFFECTS OF GAMMA RADIATION ON AQUEOUS SOLUTIONS OF PHENOLS,
Florida Inst. of Tech., Melbourne. Univ. Center for Pollution Research.
L. M. Coffman, and D. D. Woodbridge.
Bulletin of Environmental Contamination and Toxicology, Vol 11, No 5, p 461-466, May, 1974. 1 fig, 13 ref.

Descriptors: *Irradiation, *Waste water treatment, *Phenols, Gamma rays, Laboratory tests, Feasibility studies.

The beneficial use of radiation has been investigated for many applications. Radiation research and development applied to waste water treatment has been limited; however, sufficient research has been done to indicate that the use of radiation may be beneficial in the treatment of urban and industrial waste water. The irradiation process is explained and the experimental procedure involving irradiation of aqueous solutions of phenols outlined. Results show that the phenol structuer can be destroyed by gamma radiation. At phenol concentrations of 10 mg/liter almost complete destruction occurred at a dose rate of one million rads. Furthermore, this work indicates that the destruction of phenols by gamma radiation from Cobalt-60 is feasible. (Sandoski-FIRL)
W74-13274

ATMOSPHERIC COOLERS FOR COOLING INDUSTRIAL WATERS,
M. Vitek.
Czechoslovak Heavy Industry, No 4, p 39-44, 1974. 7 fig, 1 tab.

Descriptors: *Industrial water, *Water cooling, *Cooling towers, Equipment, Municipal water, Fresh water, Waste water treatment, Treatment facilities.
Identifiers: *Microtowers.

Microtowers, atmospheric coolers of the M range, are coolers of industrial water with fans, manufactured mostly of plastics. These are easy to assemble, and alleviate the shortage of fresh water for towns as well as for industries. Microtowers are manufactured in four sizes which are chosen so that all requirements for cooling circuits of smaller capacities can be met. The cooling of the larger quantity of water can be arranged by the connection in parallel of several microtowers in a cooling circuit. One advantage of a parallel connection of several cooling towers is easy maintenance. Also, the probability of cutting some unit out of service increases as the weather gets cooler. Microtowers are of a simple design, their erection and attendance are easy, and their operation is economical within a wide range of operating conditions. (Sandoski-FIRL)
W74-13275

REVERSE OSMOSIS CUTS SOLIDS,
Gibbs and Hill Inc., New York.
V. T. Burns, Jr.
Water and Wastes Engineering, Vol 11, No 5, p C-6-C-12, May, 1974. 2 fig, 3 tab.

Descriptors: *Reverse osmosis, *Waste watr treatment, Industrial water, *Dissolved solids, Treatment facilities, Water supply, Coal, Equipment, *West Virginia.

A new reverse osmosis unit with a capacity of 250 gpm is reducing total dissolved solids while providing water to the Harrison Power Station near Haywood, West Virginia. The station consists of three 600 MW units with steam design conditions at 3675 psig with reheat to 1000 F. The primary fuel is pulverized coal which is normally delivered by overland conveyor from a nearby mine. Water supply for make-up to recirvulating cooling systems is from the West Fork River. Two natural draft towers serve the three units. Water for make-up to the thermal cycle, potable use, fire head tank, and filtered water for miscellaneous service is designed for supply from an existing reservoir. Emergency backup comes from the West Fork River. This emergency backup supply of 650 gpm is taken from the 36-inch pipelines providing make-up supply to cooling systems. (Sandoski-FIRL)
W74-13280

EMULSIFIED OILY WATER TREATING EQUIPMENT.
Technical Review, Vol 11, No 1, p 79-82, February, 1974. 6 fig, 3 tab.

Descriptors: *Oily water, *Waste water treatment, *Treatment facilities, Equipment.

Mitsubishi Heavy Industries has recently developed systems for treatment of waste water contaminated with soluble cutting oil. These systems have been effectively utilized on practical scales, and are illustrated. An outline of the systems for treating such waste water is provided. (Sandoski-FIRL)
W74-13281

PACKAGE TYPE WASTE WATER TREATING APPARATUS.
Technical Review, Vol 11, No 1, p 83-84, February, 1974. 3 fig, 1 tab.

Descriptors: *Equipment, *Oily water, *Waste water treatment, Flotation, Treatment facilities, Performance.

A package type apparatus can be widely used for effective treatment of waste water by the chemical flotation method including the treatment of oily water, that of waste water arising from the marine products processing industry, and that of non-precipitating waste water containing suspended solids. For treating oily water, a coalescer is used for the primary treatment behind which this apparatus is installed to be used for the secondary treatment to guarantee that the final oil content in the waste water treated is below 1 ppm. For other waste water treatment, the coalescer is not required. Examples of the performance of this waste water treatment apparatus against various kinds of waste water are tabulated. (Sandoski-FIRL)
W74-13282

WATER-TREATMENT-PLANT WASTES DISPOSAL-PART 1,
Malcolm Pirnie, Inc., Paramus, N.J.
For primary bibliographic entry see Field 5F.
W74-13284

RECOVER ALUM TO REDUCE WASTE-DISPOSAL COSTS,
Metcalf and Eddy, Inc., New York.
G. P. Fulton.
Journal of the American Water Works Association, Vol 66, No 5, p 312-318, May, 1974. 4 fig, 2 tab, 1 ref.

Descriptors: *Aluminum, *Waste water treatment, *Sludge treatment, Dewatering, *Recycling, Waste disposal, Methodology, *Costs, Treatment facilities, Equipment.

Alum is widely used in water treatment, but current investigations of other coagulants to be used were held, due to the difficulty in disposing of alum sludge. A relatively easy, inexpensive method that makes possible pre-treatment of alum sludge so that it can be dewatered and reused is described. This convertible alum-recovery process offers several advantages. The aluminum hydroxide-raw-water suspended-matter wastes are relatively easy to separate from the discharge carrier flow. This leaves a supernatant of good quality for recycling through the water plant. Since an alternative method of waste disposal is mandatory for any type of waste recycle, alum recovery is the most economical to install and to operate. The reduced need for new or make-up alum decreases both delivery handling and delivery-truck traffic. In addition, the use of alum as a coagulant without affecting well-established water treatment methods is retained. (Sandoski-FIRL)
W74-13285

VARENESS WATER PLANT PLANNED FOR EXPANSION.
Water and Pollution Control, Vol 112, No 5, p 16-17, May, 1974.

Descriptors: *Water supply, *Treatment facilities, *Canada, Design criteria, Flocculation, Sedimentation, Filtration, Construction costs, Instrumentation, Equipment, Sand, Lime, Hydrogen ion concentration, St. Lawrence River, *Waste water treatment.
Identifiers: Anthracite filtration.

The city of Varennes, located on the south shore of the St. Lawrence River opposite Montreal, Canada, has recently completed a major expansion of its water supply facilities. Designed with an initial capacity of 2.0 mgd with provision for expansion to 6.0 mgd, the facility provides for flocculation, sedimentation, plus rapid sand and anthracite filtration. Built at a cost of $1.25 million, the new plant also incorporates a laboratory equipped with sample taps to analyze raw, mixed, flocculated, pre- and post-filtered, and finished water. Instrumentation and equipment includes a Zeta potential meter, filterability plague, void pump, and turbidimeters. Polyelectrolite can be added to assist filtration. Chlorine dioxide is used to help remove occasional taste and odor. Lime can be incorporated to correct pH, and fluor is also available. (Sandoski-FIRL)
W74-13286

TREATMENT OF OILY WASTE WATER USING ACTIVATED CARBON,
T. Matsumoto, M. Inoue, T. Takeuchi, and E. Sugimoto.
Mitsui Zosen Giho (Mitsui Shipbuilding Technical Review), Vol 85, p 1-10, January, 1974. 14 fig, 1 tab, 6 ref.

Descriptors: *Waste water treatment, *Oily water, *Activated carbon, Adsorption, Mathematical studies.

Experiments were carried out on the treatment of oily waste water using activated carbon with about 10 ppm oil at the inlet and less than 1 ppm at the outlet of the fluidized bed adsorption column. Results are presented in mathematical formulas. (Sandoski-FIRL)
W74-13287

STUDY ON MECHANICAL SURFACE AERATOR,
I. Shiramasa.
Mitsui Zosen Giho (Mitsui Shipbuilding Technical Review), Vol 85, p 61-66, January, 1974. 9 fig.

Descriptors: *Aeration, Equipment, *Activated sludge, Design criteria, Oxygen requirements, Efficiencies, *Waste water treatment.
Identifiers: *Mechanical aerators, Oxygen transfer.

Mechanical aerators have become widely used in the activated sludge process due to their simplicity of design and construction and superiority in oxygen transfer capacity per unit horsepower. Hydraulic and oxygen-transfer tests were conducted with the following results being obtained. Oxygen transfer efficiency is directly proportional to the horesepower, and oxygen transfer capacity is approximately equivalent to 2.5 kg 02/kWH. The shape of the blade is very important in controlling oxygen transfer capacity by change in the depth of its submergence. Aerator speed must be between 3 and 6 m/sec at the extremity of the blade. A baffle must be provided for the aeration tank to prevent surging. A change in the number of blades plus a change in the depth of submergence results in a change in the oxygen transfer coefficient. (Sandoski-FIRL)
W74-13288

ADVANCED SEWAGE TREATMENT PILOT PLANT FOR DAVYHULME,
M. Sane.
Water and Waste Treatment, Vol 17, No 5, p 18-20, May, 1974. 1 fig, 2 tab, 1 ref.

Descriptors: *Pilot plants, Equipment, *Treatment facilities, Construction materials, Investigations, *Sewage treatment, Flow rates, Instrumentation, Monitoring, Sludge treatment, Waste water treatment.
Identifiers: *United Kingdom(Davyhulme-Eng).

The aims of the Davyhulme, England, pilot plant; the equipment to be installed; and the various treatment processes available for investigation using the equipment provided are outlined. The pilot plant, designed primarily for manual control, should abstract up to 96,000 gpd of raw screened and macerated sewage from below the intake works, abstracting at either fixed rates of flow from 500 to 4000 gph or in accordance with a

prearranged program representing a diurnal variation of flow. All process vessels incorporated in the plant will be fabricated in steel, suitably protected, to facilitate dismantling and re-erection on alternative sites. (Sandoski-FIRL)
W74-13290

THE EUROPEAN SCENE,
Emschergenossenschaft and Lippeverband, Essen (West Germany). Dept. of Chemistry.
F. Malz.
Water Pollution Control, Vol 73, No 3, p 289-294, 1974. 2 tab.

Descriptors: *Europe, *Sewage treatment, *Treatment facilities, Industrial wastes, Monitoring, Water quality control, Organizations, Waste water treatment.
Identifiers: *Switzerland, *Holland, *Sweden, *West Germany.

A description of sewage treatment facilities in Switzerland, Holland, Sweden, and Western Germany is presented. The trend of improvement of their technical activities in the control of water pollution is examined. Various water associations are mentioned as well as treatment practices for industrial wastes and water quality monitoring. (Sandoski-FIRL)
W74-13293

THE SEALING MECHANISM OF WASTE-WATER PONDS,
California Univ., Riverside. Dept. of Soil Science and Agriculture.
A. C. Chang, W. R. Olmstead, J. B. Johanson, and G. Yamashita.
Journal Water Pollution Control Federation, Vol 46, No 7, p 1715-1721, July, 1974. 5 fig, 5 tab, 11 ref.

Descriptors: *Soil water movement, *Hydraulic conductivity, *Soil types, Waste storage, Ponds, Soil chemistry, Cations, Anions, Suspended solids, Microbial degradation, Waste water treatment.

The change of hydraulic conductivity in soils under prolonged submergence of waste water has been determined together with the chemical change of soils at the bottom of waste water ponds and the mechanism that reduces the rate of infiltration in these ponds. Columns of four different soil types recovered from the bottom of the pond indicate a quick reduction of soil hydraulic conductivity and a sharp increase of leachable cations and anions in all soils studied. The layer that restricted the movement of water initially occurred at the surface, two inches into the soil column. The initial sealing was caused by the physical entrapment of suspended particles in soil followed by a secondary mechanism of microbial growth that completely sealed off the soil from water movement. The drying of these completely sealed off columns returned the hydraulic conductivity of columns back to the initial magnitude thus indicating that the inhibition of water movement in soils was not caused by the change of cations that cause the deflocculation of soil particles. (Sandoski-FIRL)
W74-13299

ELECTROCHEMICAL TREATMENT OF INDUSTRIAL WASTE WATER,
Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
Y. Kuji, T. Kato, and M. Maeda.
Mitsubishi Denki Giho, Vol 48, No 4, p 418-423, April, 1974. 16 fig, 6 tab, 4 ref.

Descriptors: Equipment, *Electrodes, Electrochemistry, Application techniques, *Industrial wastes, *Waste water treatment, Flocculation.
Identifiers: *Electrochemical flocculation, *Japan.

In the past a drawback to the electrochemical treatment of industrial waste water has been the accumulation of scale on the surface of the electrode which prevents current from flowing, thus stopping the function device. Mitsubishi Industries has developed an epochal electrochemical treatment device with minute gap high speed flow to eliminate this problem. The features of the unit and examples of its application are presented. Basic theory of electrochemical flocculation is also explained. (Sandoski-FIRL)
W74-13303

CHEMICAL TREATMENT OF LEACHATES FROM SANITARY LANDFILLS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
S. Ho, W. C. Boyle, and R. K. Ham.
Journal Water Pollution Control Federation, Vol 46, No 7, p 1776-1791, July, 1974. 4 fig, 12 tab, 5 ref.

Descriptors: *Leachate, Evaluation, Chemical reactions, Water quality, Laboratory tests, Chemicals, *Landfills, *Waste water treatment.
Identifiers: Treatment methods, *Chemical treatment.

The treatability of leachate by physical-chemical methods has been studied. The objective of the study was to evaluate the ability of various chemicals to remove key contaminants from leachate; the approach was to determine the potential usefulness of each class of chemicals that conceivably could be used to treat leachate. The results of this study should not be considered adequate for design purposes. Because of variations in leachate composition, treated water quality objectives, and site limitations, it is expected that more detailed laboratory testing should be conducted prior to final design for any given installation. Results of this study can be used in determining which of the various treatment schemes available should be examined further. (Sandoski-FIRL)
W74-13305

WASTE WATER TREATMENTS INCLUDING OZONATION PROCESS,
S. Suzuki, Y. Mizukami, Y. Kuji, M. Morikawa, and H. Matsuoka.
Mitsubishi Denki Giho, Vol 48, No 4, p 405-417, April 1974. 37 fig, 14 tab, 13 ref.

Descriptors: *Ozone, *Waste water treatment, Water purification, Tertiary treatment, Water reuse, *Industrial wastes.
Identifiers: *Ozonation, *Japan.

The characteristics of ozonation are described and various practical treatment systems are presented for the Mitsubishi industries. Cases and experimental results of ozonation of phenol and cyanide containing water for sterilization are reported. Finally, results at a tertiary treatment test plant for reuse of sewage water are disclosed. (Sandoski-FIRL)
W74-13306

WASTE TREATMENT PLANT MINIMIZES EFFLUENT.
Modern Power and Engineering, Vol 68, No 4, p 50-51, 83-84, April, 1974.

Descriptors: *Treatment facilities, *Waste water treatment, Industrial wastes, Waste treatment, Performance, Chemical wastes, Design criteria, Effluents, *Canada.

A waste treatment plant at Air Canada's new 500,000 square foot maintenance base provides efficient waste treatment to a wide variety of liquid effluents from cleaning, stripping, electroplating, surface metal finishing, heat treatment, and machining of aero engine parts. The system handles 500,000 pounds of alkalies, 12,000 pounds of cyanides, 4500 pounds of potassium permanganate, and 4000 pounds of hexavalent chrome each year. Toxic chemical wastes from the maintenance processes are destroyed, neutralized, or extracted before the plant's liquid wastes are discharged into the sewage system. Design features and performance of the system are detailed. (Sandoski-FIRL)
W74-13307

EFFLUENT TREATMENT AT PLESSEY CO LTD.
Metal Finishing Journal, Vol 20, No 233, p 147-150, June, 1974.

Descriptors: *Treatment facilities, *Industrial wastes, Effluents, Automatic control, Water reuse, *Waste water treatment, Polyelectrolytes, Equipment, Metals.
Identifiers: *United Kingdom(Ilford-Eng).

As part of an extensive expansion and modernization program, a new electroplating and metal finishing department was recently put into service at The Plessey Company's headquarters in Ilford, England. A very wide range of processes are utilized, including nickel, cadmium, tin, silver, and gold plating, in addition to the usual vapor and aqueous degreasing, derusting, and chromate passivation processes. Fume extraction is provided for all process tanks, and a temperature controlled ventilation system delivers filtered air at a controlled rate to the entire plating shop. This ensures exceptional cleanliness and pleasant working conditions. (Sandoski-FIRL)
W74-13308

PHOSPHATE REMOVAL FROM DUCK FARM WASTES,
Cornell Univ, Ithaca, N.Y. Dept. of Civil and Agricultural Engineering.
R. C. Loehr, and K. J. Johanson.
Journal Water Pollution Control Federation, Vol 46, No 7, p 1692-1714, July, 1974. 10 fig, 7 tab, 6 ref.

Descriptors: Investigations, *Phosphates, Industrial wastes, *Waste water treatment, *Farm wastes, Chemicals, Operating costs, Evaluation.
Identifiers: Phosphate removal, Sludge production.

Studies of phosphate removal from industrial waste water resulting from the production of ducks for slaughter are detailed. These studies were conducted over a period of two years, initially in the laboratory and subsequently in two full-scale field systems. The most effective chemicals, predictive relationships for chemical dosage, operating costs, and sludge production levels were evaluated. (Sandoski-FIRL)
W74-13309

BIOLOGICAL TREATMENT OF WASTE-WATER USING ALGAE AND ARTEMIA,
Texas Univ., Galveston. Medical Branch.
M. McShan, N. M. Trieff, and D. Grajcer.
Journal Water Pollution Control Federation, Vol 46, No 7, p 1742-1750, July, 1974. 4 fig, 6 tab, 21 ref.

Descriptors: *Waste water treatment, *Biological treatment, *Algae, *Brinp, Methodology, Operating costs, Biomass, *Waste water treatment.
Identifiers: *Artemia.

A new system for controlled eutrophication for either waste water or high organic wastes, such as shrimp ponds, has been researched. This system utilizes algae and brine shrimp as its main components. In such a system the algae fix the organic and mineral components bu using a light source; the brine shrimp graze on the algae, thus keeping the algae at a constantly high productivity level. The choice of brine shrimp is based on their ability

to withstand wide fluctuations in salinity and pH and to remain there. The system is adaptable to coastal and inland communities and the produced brine shrimp could offset some of the costs of the system. (Sandoski-FIRL)
W74-13311

DEGRADATION OF ORGANIC NITROGENOUS COMPOUNDS BY PSYCHROPHILIC BACTERIA,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
D. Prasad, and P. H. Jones.
Journal Water Pollution Control Federation, Vol 46, No 7, p 1686-1691, July 1974. 4 fig, 25 ref.

Descriptors: *Laboratory tests, *Model studies, *Aerobic bacteria, Activated sludge, Nitrogen compounds, Microbial degradation, Organic compounds, Biological treatment, Microorganisms, Temperature, Waste water treatment.
Identifiers: *Waste stabilization, *Psychrophilic activity, *Psychrophiles.

The proteolytic activity and other physiological activity of a mixed bacterial population adapted to a peptone feed in a laboratory model of the activated sludge process operating at 2C has been studied. The environment was selective for psychrophiles. The physiological activity of organisms inhabiting this sludge was considered to be a measure of psychrophilic activity. Results indicate that in spite of the apparent metabolic stability of proteins at low temperatures, the psychrophilic bacteria may use other nitrogenous compounds such as urea, amino acids, and creatinine as a nitce. The comparative degradation rates of various organic compounds by psychrophilic bacteria at 20 and 2C indicate that these microorganisms play an important role in the stabilization of organic matter in the biological waste treatment processes. However, their activity at 2C is lower indicating that biological waste treatment processes can operate at low temperatures provided sufficient time is allowed for these organisms to degrade the organic wastes. (Sandoski-FIRL)
W74-13312

POLLUTION OF A STORAGE RESERVOIR BY ROOSTING GULLS,
Public Health Lab. Service, Leeds (England).
H. Fennell, D. B. James, and J. Morris.
Water Treatment and Examination, Vol 23, No 1, p 5-24, 1974. 4 fig, 2 tab, 25 ref.

Descriptors: *Reservoirs, *Salmonellae, *Gulls, Domestic wastes, Pollution, Water quality control, Bacteria, Surveys, Water pollution effects, *Waste water treatment.
Identifiers: Treatment methods.

A survey to evaluate pollution caused by roosting gulls was made over a thirteen month period on a storage reservoir. From the 111 samples taken from the reservoir, salmonellae were isolated from 52, although the specimens never originated from the incoming water from the catchment area. Treatment of the reservoir water effectively eliminated the pollution, never isolating the organisms from treated water or distribution. Roosting gulls are at their maximum in population in December and their minimum between April and July. During the winter a noticeable deterioration occurred in the bacteriological quality of reservoir water. It is suggested that domestic wastes from dumps provides sources of salmonallae, and that by feeding on such refuse, the gulls contaminate the reservoir. (Leibowitz-FIRL0
W74-13316

VELOCITY CONTROL WITH NEW PROPORTIONAL WEIRS,
Madras Univ., Guindy (India). Dept. of Hydraulics and Water Resources.
D. Chandrasekaran, and N. S. L. Rao.
Journal of the Institution of Engineers (India), Vol 54, Part PH2, p 48-54, February, 1974. 5 fig, 2 tab, 6 ref.

Descriptors: *Weirs, *Sediment, *Sewage treatment, *Water purification, *Settling tank, Flow velocity, *Waste water treatment.
Identifiers: Proportional weirs.

The design of an outlet weir is detailed and its potentiality to control the mean velocity of flow is described. Velocity varies inversely with the depth of flow. The settling phenomenon of sediment particles is important in sewage treatment plants, water purification works, and chemical mixing plants. Of many varied factors that affect settling, only the mean velocity of flow in a settling tank can be easily controlled by the designer. The control of mean velocity can be readily achieved by fixing suitably designed weirs at the outlets of the settling tanks or chambers. (Prague-FIRL)
W74-13323

THE WORK AND FACILITIES OF THE BRIXHAM LABORAORY OF IMPERIAL CHEMICAL INDUSTRIES LIMITED,
Water Pollution Control, Vol 73, No 3, p 336-340, 1974. 4 fig.

Descriptors: *Laboratory tests, *Industrial wastes, Effluents, *Analytical techniques, *Biological treatment, Surveys, Sampling, Investigations, *Waste water treatment.
Identifiers: *United Kingdom, Chemical treatment.

The Brixham Laboratory of the Imperial Chemical Industries has facilities and services available both to ICI and for outside industry. These enable work to be done on any operation normally encountured in effluent and pollution control. Analytical services use modern instrumental methods such as radioactive tracer techniques, gas-liquid chromatographs, and a special technique for analysis of total carbon. Areas of treatment include chemical and physical treatment, pilot investigations of biological treatment and ancillary processes, tertiary treatment, and work site surveys. Disposal research includes field surveys, biological surveys of fauna and flora samples, bacteriological surveys, and bioassays. (Prague-FIRL)
W74-13324

LOOE SEWERAGE AND SEWAGE-TREATMENT SCHEME,
Mouchel (L. G.) and Partners, Bath, (England).
C. Martin.
Water Pollution Control, Vol 73, No 3, p 331-335, 1974. 1 fig.

Descriptors: *Sewerage, *Combined sewers, *Sewage treatment, Storm runoff, Pollution abatement, Sewage districts, Planning, Costs, *Waste water treatment.
Identifiers: Treatment methods, *United Kingdom.

Since 1955, sewerage facilities in Looe have been planned. Treatment and disposal has been a problem, enlarged by different populations in summer and winter. Storm sewerage overflows have also been necessary to complement the combined sewer systems. The Cornwall County Council has agreed to make a substantial contribution to the cost. Looe is a holiday resort and discharge of sewage into its harbor cannot continue. Design and location of the works in an enclosed valley and removal of sewage pollution are detailed. (Prague-FIRL)
W74-13327

BERRY SEED SHELL AS FILTER MEDIA,
Visvesvaraya Regional Coll. of Engineering, Nagpur (India).
A. G. Bhole, and J. T. Nashikkar.
Journal of the Institution of Engineers (India), Vol 54, Part PH2, p 45-47, February, 1974. 5 ref.

Descriptors: *Sand filtration, *Flow, Filtration, *Filters, Dual media filters, Anthracite, Backwashing, Design criteria, *Waste water treatment.
Identifiers: *Berry seed shell.

It was found experimentally that berry seed shell satisfies the criteria required for a dual media filter. Conventional sand filtration involves the flow of materials from fine to coarse media. Its drawbacks include filter clogging and shorter filter runs. Ideally the flow should be from coarse to fine, giving longer filter runs. Upflow can not be universally used.r backwashing of an ideal filter, coarse media must remain at the top, even after fluidization. This is achieved by density differences between the two materials. Denser materials like sand can be of fine size which settles at the bottom. For the top layer, many lighter materials have been tried. Anthracite is most commonly used as coarse and light medium, but wat replaced by coal because of its higher cost. A locally available berry seed is described which resembles anthracite in almost all characteristics. (Prague-FIRL)
W74-13328

WATER TREATMENT PLANT (1140 CU M/HR) FOR SUNABEDA,
Orissa Public Health Dept., Bhubaneswar (India).
B. Mishra, S. N. Joshi, and K. N. Savalappan.
Journal of the Institution of Engineers (India), Vol 54, Part PH2, p 61-65, February, 1974. 6 fig.

Descriptors: *Waste water treat.emt, *Water quality control, Clarification, Flocculation, Water quantity, Industrial water, Design criteria, Turbidity, Treatment facilities.
Identifiers: *India(Sunabeda).

The location of an industry is often governed by the availability of an adequate quantity of water. The various unit operations involved in the 1140 cu m/hr water treatment plant at Sunabeda (Orissa) are discussed. Details of units and the design parameters of units are also given. Mertis and demerits of separate flocculation and clarification versus combination of both unit operations in one unit are shown. Construction and operation of an unconventional rapid sand gravity filter underrainage system is described. One-year performance of the plant is graphically shown with emphasis on clarified water turbidity and filtered water clarity. (Prague-FIRL)
W74-13329

SLUDGE DEWATERING WITH THE AID OF CONTINUOUSLY OPERATING PRESS-TYPE FILTERS (SCHLAMMENTWASSERUNG MIT KONTINUERLICHEN PRESSFILTERN),
I. J. Reuter, and H. Beckrath.
Aufbereings-Technik, Vol 15, No 5, p 253-259, May, 1974. 10 fig, 3 tab, 14 ref.

Descriptors: *Filters, *Municipal wastes, *Industrial wastes, *Costs, Equipment, Sludge treatment, Dewatering, Waste water treatment.

For the past eight years the filter belt press has been applied as a continuously operating press-type filter for dewatering municipal and industrial sludges. Recently, additional continuous press-type filters have been developed and tested. These include the tower press, the angle-type press, and the drum-type filter press. The machines differ primarily with regard to the operating direction of the filtering belts and the pressure to which the sludge is exposed while being dewatered. The paper quotes practical results. However, the figures available do not allow a direct, reliable comparison of the results and cost of sludge dewatering by using the four machines is compared. (Prague-FIRL)
W74-13330

THIS WATER FILTER CLEANS ITSELF,
Whitman and Howard, Inc., Boston, Mass.
S. Medlar.
The American City, Vol 89, No 6, p 63-65, June, 1974. 1 tab.

Descriptors: *Filtration, Water treatment, Contamination, Bacteria, Turbidity, Iron, Reservoirs, Filtration, Waste water treatment, Treatment facilities.

Burlington, Massachusetts uses a new water treatment technique. Using an automatic backwash carbon filter, the town's 6.0-mgd filtration plant treats water from its new 500-million gal reservoir for color, iron, taste, odor, turbidity, bacteria, corrosiveness and contamination. The plant's two filters are a silica sand with an effective size 0.60 mm, and an 8 x 30 mesh granular activated carbon. (Leibowitz-FIRL)
W74-13332

PROCESS FOR TREATING WASTES CONTAINING CHROMATES AND /OR COMPLEX IRON CYANIDES,
Amchem Products, Inc., Ambler, Pa. (assignee).
T. D. Henley, and R. F. Reeves.
United States Patent 3,819,051. Issued June 25, 1974. Official Gazette of the United States Patent Office, Vol 923, No 4, p 1377, June 25, 1974.

Descriptors: *Waste water treatment, *Patents, *Liquid wastes, Effluents, Anions, Precipitates.
Identifiers: *Chromates, *Iron cyanides.

Dissolved hexavalent chromium and dissolved complex iron cyanide (Fe(CN)6) are removed from a liquid waste effluent by adding a reducing agent with an anion capable of reducing the hexavalent chromium to trivalent chromium and a cation which forms a solid or precipitate with the complex iron cyanide. The preferred reducing agent is zinc hydrosulfite (ZnS2O4). (Prague-FIRL)
W74-13333

FLUID FILTER,
Donaldson Company, Inc., Minneapolis, Minn. (assignee).
R. L. Firth.
United States Patent 3,819,052. Issued June 25, 1974. Official Gazette of the United States Patent Office, Vol 923, No 4, p 1377, June 25, 1974. 1 fig.

Descriptors: *Filters, *Patents, Equipment, Flow, Liquids, Waste water treatment.
Identifiers: *Fluid filters.

A fluid filter was patented where a first cylindrical filter housing has an open top and is at least partially surrounded by a second housing. This forms a passageway. A baffle with a central opening is mounted in the open top and a cylindrical filter element is biased against the baffle member in the first housing. A dome-shaped cover is attached on top of the second housing to provide a flow path for fluid into the filter element. This gives passage through the filter element and then through an opening in the second housing. A combination bypass-indicator member is attached to the top of the movable filter element for guided sliding movements in the central opening of the baffle member. (Prague-FIRL)
W74-13334

UNIVERSAL BASIN FOR USE IN A SEWER SYSTEM,
For primary bibliographic entry see Field 8A.
W74-13335

PROCESS FOR THE REACTIVATION OF POWDERED CARBON,
CPC International, Inc., Englewood Cliffs, N.J. (assignee).
F. L. Corson.
United States Patent 3,816,338. Issued June 11, 1974. Official Gazette of the United States Patent Office, Vol 923, No 2, p 683-684, June 11, 1974. 1 fig.

Descriptors: *Patents, *Liquid wastes, Purification, Waste water treatment, Organic matter, Suspension, Slurries, *Activated carbon.
Identifiers: *Reactivation.

A process was patented which describes a method for the reactivation of spent powdered carbon for purification of waste waters as well as other liquids. The invention describes a continuous process for the reactivation of spent powdered carbon containing adsorbed organic matter. Particle sizes are smaller than about 100 mesh, and have a reactivation efficiency of at least about 80 percent, and a product yield of at least about 90 percent by weight. This process comprises dispersing the spent carbon in water to form an aqueous suspension with a solids content of from about 20 percent to about 35 percent by weight. The suspension is atomized with steam and the atomized suspension is passed in an atmosphere substantially free of oxygen through a radiantly heated reactor vessel, with a wall temperature of from about 1200 F to about 1900 F. A time period of from about 5 to about 30 seconds is used. The carbon to and from the reactor is handled in a slurry form, which eliminates dust losses. (Prague-FIRL)
W74-13336

TARGET SYSTEM FOR LAYING SEWER PIPES,
Laser Alignment, Inc., Grand Rapids, Mich. (assignee).
For primary bibliographic entry see Field 8A.
W74-13337

EXPERIENCES WITH BUTTERFLY VALVES,
Kansas City, Mo. Div. of Water Supply.
For primary bibliographic entry see Field 8A.
W74-13338

BASIC CHARACTERISTICS OF OZONIZERS AND EVALUATION OF 'MITSUBISHI OZONIZER',
Mitsubishi-Heavy Industries, Ltd., Omiya, (Japan). Central Research Lab.
N. Tabata, S. Yagi, S. Inoue, S. Noda, and S. Koikawa.
Mitsubishi Denki Giho, Vol 48, No 4, p 424-430, April, 1974. 17 fig, 4 tab, 7 ref.

Descriptors: *Ozone, Equipment, Water purification, Data collections, Construction materials, Performance, *Waste water treatment, Industrial wastes.
Identifiers: *Ozonizers, *Japan.

Ozonizers are recognized effective devices for purification of water and air. Their systemizing has become increasingly important with their efficiency and elargement of scale. The basic concept of discharge physics with regards to ozonizers developed by Mitsubishi Industries is examined. Fundamental data regarding ozone generating efficiency are presented; the type and construction of Mitsubishi ozonizers marketed together with ozone generation characteristics are included. (Sandoski-FIRL)
W74-13412

DEODORIZATION WITH OZONE,
Mitsubishi-Heavy Industries Ltd., Oniza, (Japan). Central Research Lab.
K. Azuma, K. Doi, M. Morikawa, and M. Kose.
Mitsubishi Denki Giho, Vol 48, No 4, p 431-437, April, 1974. 19 fig, 3 tab, 11 ref.

Descriptors: *Ozone, *Waste water treatment, Industrial wastes, Pulp and paper industry, Activated carbon, Equipment, Performance, *Odor.
Identifiers: *Deodorization.

The theory of deodorization using ozone is outlined and examples of successful deodorization of exhaust gas and waste water from kraft pulp factories and marine product processing plants are given. Similar treatment of exhaust gas from food processing works also is discussed. The possibility of accelerating the reactions on the surface of activated carbon with ozone in the case of mercaptan and hydrogen sulfide in which gas phase oxidation is too slow is explored. Finally, the manufacture of a deodorizing apparatus consisting of a scrubber with ozone dissolved water as an absorbent is examined. (Sandoski-FIRL)
W74-13413

INCINERATION OF LIQUID WASTES,
S. W. Sim.
Chemical Processing, Vol 20, No 5, p 32-34, May, 1974. 3 fig, 1 tab.

Descriptors: *Chemical wastes, *Liquid wastes, *Industrial wastes, *Incineration, Inorganic compounds, Organic compounds, *Waste water treatment, Waste Water disposal, Operating costs, Economics, Treatment facilities, Equipment, Sodium compounds, Foreign research, Effluents, Oxidation.
Identifiers: *NICE process, Chemical recovery, Japan.

A rief description is given of the operation and design of the NICE process (developed by Nittetu Chemical Engineering Co., Tokyo) for liquid waste incineration and salt recovery. The equipment consists of an incinerator lined with refractory bricks and a gas quench system. The incinerator is equipped with two fluid atomizing jets for injecting the waste into the incinerator and an auxiliary fuel burner for maintaining optimum operating temperatures. It was designed specifically for chemical effluents and is particularly suited to wastes containing inorganic salts alone or in combination with organic constituents. A table is presented listing commercially operating units. The majority of the applications are for complete destruction of organic materials in an oxidizing atmosphere, but the process can be operated under reducing conditions when treating, for example, purge liquor from coke oven gas desulfurization plants. Operating costs are given for a unit handling sodium organic effluent requiring oxidation of organic material and recovery of alkali salt for process reuse, and for a unit treating purge liquor from coke oven gas desulfurization plants. (Witt-IPC)
W74-13420

ACTIVATED SLUDGE MICROFLORA IN AERATION PONDS FOR SECONDARY PURIFICATION OF PULP AND PAPER MILL EFFLUENTS (ISSLEDOVANIE MIKROFLORY AKTIVNOGO ILA AERIRUEMYKH PRUDOB PO DOOCHISTKE STOCHNYKH VOD TSELLYULOZNO-BUMAZHNYKH PREDPRIYATII),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshlennosti, Leningrad (USSR).
M. A. Lomova, and R. M. Ryabkova.
Issledovaniya v Oblasti Proizvodstva Polufabrikatov i Ochistki Promyshlennykh Stokov, Sbornik Trudov VNNIB, No 61, p 211-216, 1972. 1 fig, 1 tab, 5 ref.

Descriptors: *Waste water treatment, *Pulp wastes, *Biological treatment, *Activated sludge, *Aerated ponds, *Aeration, *Microorganisms, Pulp and paper industry, Waste treatment, Industrial wastes, Treatment facilities, Foreign research, Biochemical oxygen demand, Lignins, Pollutants, Oxidation, Adaptation, Bacteria, Biodegradation, Effluents.
Identifiers: USSR, Zhidachev Pulp and Paper Mill(USSR), Kotlas Pulp and Paper Mill(USSR).

In a Soviet process for biological purification of sulfite and kraft mill waste waters, pretreatment in aeration tanks with activated sludge removes 90-92% of the 5-day BOD load, followed by further treatment of difficultly oxidizable substances, such as lignin, in aeration ponds. Studies of the pond efficiency and pond microflora were conducted under conditions of continuous flow without sludge recycling, using pretreated effluents from the Kotlas and the Zhidachev pulp and paper mills which had a pH of 7.8-9.1 and contained 15-25 mg of 5-day BOD, 1.0-1.4 mg of N, and 0.3-0.5 mg of P per liter. During the first 2 days of pond residence, the microflora remained basically the same as in the original activated sludge, although the numbers of bacteria belonging to different physiological groups differed. On the third day, an adaptation process manifested itself by the appearance of a more specific microflora comprising spore formers and lignin-utilizing bacteria. Since the oxidation rate in the pond dropped sharply after the first day, it seems that improved pond oxidation efficiencies may be obtained by preliminary adaptation of microorganisms. (Stapinski-IPC)
W74-13425

CALCULATIONS FOR DISPLACEMENT-TYPE AERATION TANKS (RASCHET AEROTENKOV-VYTESNITELEI),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshlennosti, Leningrad (USSR).
M. A. Evilevich, L. K. Korovin, A. V. Naumov, and B. S. Pritsker.
Issledovaniya v Oblasti Proizvodstva Polufabrikatov i Ochistki Promyshlennykh Stokov, Sbornik Trudov VNNIB, No 61, p 190-204, 1972. 7 fig, 10 ref.

Descriptors: *Mathematical models, Model studies, *Activated sludge, *Waste water treatment, *Biodegradation, *Aeration, *Aerated lagoons, *Biological treatment, Treatment facilities, *Pulp wastes, Pulp and paper industry, Europe, Foreign research, Kinetics, Oxidation, Effluents, Waste treatment, Water pollution control, Pollution abatement, Sorption, Adsorption, Equations, Theoretical analysis.
Identifiers: USSR, Kotlas Pulp and Paper Mill(USSR), Freundlich equation, Monod equation.

A mathematical model is presented of the biological purification process in displacement-type aeration tanks, based on the following premises: (1) the organic loading of effluents comprises both readily and difficultly oxidizable compounds; (2) the bio-oxidation of oxidizable compounds can be represented as several superimposed parallel reactions, viz., biosorption, bio-oxidation (including biosynthesis of new cell material), and oxidation of activated sludge cells; (3) for stable bio-purification, the bulk of the sorbent (activated sludge) must be regenerated; (4) this is achieved in practice by reducing the amount of sorbed matter to 3-5% of that sorbed initially; (5) bio-oxidation of the oxidizable fraction, as measured by five-day BOD tests, must be taken into account. Theoretical analyses show that biosorption kinetics are satisfactorily described by a Freundlich equation, while bio-oxidation kinetics follow a Monod-type equation and correlate well with oxygen consumption. The model establishes a relationship between effectiveness of purification on one hand and effluent concentration, sludge volume, aeration time, and sludge plus effluent qualities on the other hand. The model was found suitable for calculating variables ofwaste water purification. Calculated data agreed well with experimental data obtained from aeration tanks operating at the Kotlas pulp and paper mill (USSR). (Stapinski-IPC)
W74-13427

LIQUID VELOCITY DISTRIBUTION IN AERATION TANKS WITH MECHANICAL AERATORS (RASREDELENIE SKOROSTEI ZHIDKOSTS V AEROTENKAKH S MEKHANICHESKIMI AERATORAMI),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshlennosti, Leningrad (USSR).
L. I. Braginskii, M. A. Evilevich, V. I. Begachev, and V. A. Kulukhov.
Issledovaniya v Oblasti Proizvodstva Polufabrikatov i Ochistki Promyshlennykh Stokov, Sbornik Trudov VNNIB, No 61 p, 180-189, 1972. 4 fig, 9 ref.

Descriptors: *Aeration, Equipment, Treatment facilities, *Pulp wastes, *Aerated lagoons, *Operation and maintenance, Theoretical studies, *Mixing, Fluid mechanics, Flow rates, Hydraulic structures, Hydraulic machinery, Hydraulic equipment, *Waste water treatment, Biochemical oxygen demand, Energy, Turbines, Equations, Mathematical studies.
Identifiers: Pneumatic equipment, Aerators, Energy consumption.

Mechanical mixing with simultaneous air input beneath the agitator is shown to be the most economical arrangement for aeration tanks. Pneumatic-mechanical aerators can achieve significant effluent purifications (better than 2000 g of 5-day BOD/cu m/day) with a power consumption of 0.5-0.8 kw-hr/kg of 5-day BOD. Determining the optimum aerator operating variables requires calculations of hydraulic conditions in the aeration zone. A theoretical analysis was conducted of the rotary motion of liquid in pneumo-mechanical aerators. Equations were derived to describe the peripheral motion profile as a function of type and rotary velocity of the aerator and of aerator/tank dimension ratio. Results of calculations were confirmed by experimental data obtained for turbine and paddle-type aerators. (Stapinski-IPC)
W74-13428

IMPROVED CONTROL OF RADIOACTIVE WASTE AT HANFORD,
Directorate of Licensing (AEC), Bethesda, Md.
F. E. Stubblefield, and E. B. Jackson.
Available NTIS, Springfield, Va 22161 as Rept, No WASH-1315. $3.75/copy, $2.25/microfiche. Report No WASH-1315, June 1974. 29 p, 19 fig.

Descriptors: *Management, *Radioactive waste disposal, *Waste storage, *Effluents, Nuclear powerplants, Columbia River, Plutonium, Fuels, Neptunium, Uranium, Liquid wastes, Solid wastes, Gases, *Washington.
Identifiers: *Hanford Site(Wash), Fuel processing.

The Hanford Waste Management program is actively pursing a course designed for an improvement in regard to control of radioactive waste. The improved position is an interim step in some yet-to-be-determined, long-term disposal scheme. Detail is given for the chemical separations, plutonium fishing. Waste management operations which includes solid, liquid, and gaseous wastes. (Houser-ORNL)
W74-13430

PICKING THE BEST COAGULANT FOR THE JOB,
Water and Wastewater Plants, Daytona Beach, Fla.
T. P. Brodeur, and D. A. Bauer.
Water and Wastes Engineering, Vol 11, No 5, p 52-55, May, 1974. 4 fig.

Descriptors: *Coagulation, *Alum, *Costs, *Sludge, *Waste water treatment, Silica, *Florida, Filters.
Identifiers: Nalcolyte 8174, *Daytona Beach(Fla).

The problem was raised as to which chemical is most cost-effective in coagulation application. Findings are reported of a study done to try to resolve this problem. Alum has been used with great sucess by the municipalities of Daytona Beach, Florida for over 40 years. The study was conducted not so much to find something better than alum as it was to alleviate some of the drawbacks of its use. Typical problems with alum use are: dry powder causes handling problems; soluble alumina carry-through into the distribution system can cause fouling and dirty water; increased lime dosages are needed to counter the acidifying characteristics of alum; carryover of light floc reduces filter runs by formation of gelatinous layers on the bed; and sludge production with increased water flow causes crowding in the save-all tank and lagoons. The study compared plant-scale application of aluminum sulphate, activated silica, and a high molecular weight anionic polymer (Nalcolyte 8174). (Shaffer-FIRL)
W74-13433

FILTER AND CENTRIFUGES FOR THE DEHYDRATION OF WASTE WATER SLUDGES (FILTER UND ZENTRIFUGEN FUER DIE ENTWAESSERUNG VON ABWASSERSCHLAEMMEN),
F. Rueb.
Wasser Luft und Betrieb, Vol 18, No 5/6, p 279-282, 289, 1974. 9 fig.

Descriptors: *Dehydration treatment facilities, *Filters, *Centrifugation, *Sludge, Solid wastes, *Waste water treatment.
Identifiers: Germany.

Thin sludges left from various water purification processes must be thickened for deposition in sanitary landfills or other kinds of disposal including reuse. This had frequently been accomplished by drying in drying beds. Machines such as filter presses, drying drums, belt filter presses and sludge centrifuges gained recent increasing interest. Filter presses proved very efficient with dewatering sludges from pickling stations or galvanizing stations. A special construction is the tower filter press comprising two vertical filtering belts. The thin sludge enters on top and proceeds downward between the two belts which in the lower section exert a pressure of 1.8 to 2.5 bar. The filter cake falls out at the bottom. The tower filter press combines hydrostatic and mechanical pressure. The operating principles of drum filters, the belt filter press and the centrifuge are reviewed and illustrations of these machines are given. (Shaffer-FIRL)
W74-13434

HOW TO CURTAIL OR END DISCHARGES OF SEWAGE FROM SHIPS.
For primary bibliographic entry see Field 5G.
W74-13436

ALL PROCESSES CENTRALLY CONTROLLED AND MONITORED, (NORWICH CORPORATION).

Descriptors: *Sewage treatment, *Treatment facilities, *Automation, Computers, Sludge treatment, Equipment, Monitoring, Waste water treatment.
Identifiers: United Kingdom.

The sewage treatment facilities at Norwich, England are currently being extended to treat 55,000 cu m/day DWF of sewage from a contribution population of 197,000 persons. There are two treatment plants. One has circulation sedimentation radial flow tanks, biological filters and humus tanks with effluent pumping facilities, and the other has circular radial flow sedimentation tanks, diffused air activated sludge plant, and final settlement. The processes have been automated and interlinked into one central control system, the Kent K70 system, which has a complete range of both hardware and software for computer process control. The system is compatible with most digital computers. (Merritt-FIRL)

W74-13438

SEVEN ARCHES WORKS, (WALTON AND WEYBRIDGE).
Water and Waste Treatment, Vol 16, No 12, p 20-22, December, 1973.

Descriptors: *Treatment facilities, *Sewage treatment, Rivers, Storm water, Filters, Storage tanks, Sedimentation, Water purification, Water quality standards, Percolation, Filters, Biochemical oxygen demand, Activated sludge, Sludge treatment, Aeration, Suspended solids.
Identifiers: Kitwe(Zambia), Borough of Mossley, Lancashire(England), Seven Arches(England).

Sewage treatment works are described at Seven Arches, Weybridge, Surrey; the Borough of Mossley in Lancashire, and at Kitwe, Zambia. At Seven Arches no storm water is discharged into the River Wey. Overflows pass through two storm water tanks. The supernatant liquor is mixed with the primary sedimentation tanks effluent and then passes through the filters. An average of 15/15 standard is being achieved. At Mossley, the existing works were reconstructed and modernized due to increases in domestic and industrial wastes in the 1950's. By 1972 there was need for further extension or modernization. As a temporary measure a Flocor Roughing Filter Tower is being incorporated between the sedimentation tanks and the percolating filters. This substantially reduces the BOD content of the sewage which enables the existing filter beds to produce a much improved quality of effluent. The new works at Zambia are based upon the treatment of sewage in a two stage activated sludge process, where the first stage consists of biological filters which are intended to act in parallel with the secondary aeration tanks. (Merritt-FIRL)
W74-13439

L500,000 SLUDGE TREATMENT PLANT, (ROCHESTER, CHATHAM AND GILLINGHAM JOINT SEWERAGE BOARD).
Water and Waste Treatment, Vol 16, No 12, p 17, 19, December, 1973.

Descriptors: *Sludge treatment, *Treatment facilities, Filtering, Lime, Sludge disposal, Water pollution control, Estuaries, Design data, *Waste water treatment.
Identifiers: Iron sulfate, United Kingdom.

The design and operation of the recently completed sludge treatment and pressing plant at the Motney Hill Treatment Works of the Rochester, Chatham, and Gillingham Joint Sewage Board (England) are described. The installation will chemically condition and press the sewage sludge separated out at the treatment works. The sludge pressing plant forms part of the program of major extensions to the Motney Hill sewage treatment works to enable it to cater to the expanding population of the Medway Towns. The existing works serves a current population of approximately 215,000 and provides for comminution, grit removal, preaeration and primary settlement of the sewage before it is discharged to the River Medway. Additions are scheduled for the primary and sludge treatment facilities and the construction of a partial secondary treatment plant designed to hold the pollution load on the estuary at its present level. The following processes at the plant are described: existing sludge treatment, new sludge treatment arrangements, screening and copperas conditioning, lime conditioning, filter presses, sludge feed to the presses, sludge disposal, liquor treatment, conditioning agents, and the building services. (Merritt-FIRL)
W74-13440

80/80 STANDARD INTO BRISTOL CHANNEL (YEO VALLEY MAIN DRAINAGE SCHEME).
Water and Waste Treatment, Vol 16, No 12, p 7-9, December, 1973.

Descriptors: *Sewerage, *Treatment facilities, Design data, Equipment, Filtration, Sedimentation, *Sludge treatment, Activated sludge, Biological treatment, Pumping station, Filters, Sewage, Storage tanks, Organic matter, Pipelines, Remote control, Electricity, *Waste water treatment.
Identifiers: Barminutors, Recorders, Detritor, United Kingdom.

The Yeo Valley Main Drainage Works at Kingston Seymour, Clevedon, Somerset are described. The effluent discharges to an estuary into the Bristol Channel. The works has been designed to hydraulically handle a maximum rate of flow of 1578 liters/sec or six times ultimate dry weather flow to allow for storm flows from the old combined sewerage systems connected into the new regional scheme. The treatment consists of maceration, grit removal, filtration through high rate polyvinyl chloride filters, sedimentation and discharge through an effluent pipeline to the head of the Kingston Pill. Sludge is disposed of by heat treatment conditioning followed by filter pressing to produce a sterile sludge cake with a moisture content of 50% suitable for disposal to tip. Specifically described are the sewage treatment processes, biological oxidation, settlement, sludge disposal, inlet pipes, inlet pumping station, recorders, barminutors, detritors, filters pumping station, filters, humus tanks, booster pumping station, outfall pipeline, sludge pumping station, sludge holding tanks, transfer sludge pumping station heat treatment plant, administration building, and the remote control system, and the electricity supply and services. (Merritt-FIRL)
W74-13441

AN EXPERIMENTAL IRRADIATION FACILITY FOR THE STERILIZATION OF SEWAGE SLUDGE,
Bayerische Landesantalt fuer Bodenkultur und Pflazenbau, und Pflanzen Schutz, Munich (West Germany).
A. Suss, H. Moetsch, E. Bosshard, G. Schurmann, and O. Luescher.
Kerntechnid, Vol 16, No 2, p 65-70, January, 1974. 4 fig, 11 ref.

Descriptors: *Sludge treatment, *Treatment facilities, *Radiation, Agriculture, Design data, Sewage sludge, Sterilization, *Waste water treatment, Equipment, Evaluation, Costs.
Identifiers: *Germany(Geiselbullach).

An experimental irradiation facility for the sterilization of sewage sludge was designed and built at the sewage treatment plant of the Ampergrouppe in Geiselbullach. It is at present equipped with a 120 kCi Co 60 source and can process a daily flow of about 30 cu m sewage sludge at an exposure of 300,000 R. The treatment capacity of the facility can be raised for four or five times the present level without any structural alterations by using a stronger source. The main components of the facility consist of the irradiation shaft with a built in central tube in which the sludge is recirculated during irradiation and the recirculation system consisting of an accessible pump shaft with the recirculation and evacuation pumps, the necessary shutoff and regulation valves and pipework. (Merritt-FIRL)
W74-13442

SEWAGE AERATOR - WITH SUBMERGED MOTOR CARRIED BY FLOATS.
German Patent 1,957,793. Issued December 13, 1973. German Patents Abstracts, Vol U, No 51, p 1, January, 1974.

Descriptors: *Sewage, *Equipment, *Aeration, *Patents, Treatment methods, *Waste water treatment.

A sewage aerator with a submerged motor carried by floats is described. The motor, and the vane wheel mounted above it and driven by it, are enclosed in common by an open-ended sheathing ring between which and the motor are guide walls. When seen in cross section, the walls run radially relative to the motor. Preferably, the upper open end of the rings consists of a mouthpiece which widens toward the outside. (Merritt-FIRL)
W74-13443

ODOR ELIMINATION BY OZONE (OZON-HONI YORU AKUSHU JOKYO),
T. Azuma.
Kankyo Sozo, Vol 4, No 2, p 79-84, February, 1974. 10 fig, 2 tab, 13 ref.

Descriptors: *Ozone, *Sewage treatment, *Waste water treatment, *Odor, *Water pollution effects, *Treatment methods, Organoleptic properties.

Ozone deodorization is achieved by by both oxidation and neutralization. Most effectively neutralized or decomposed odors are mercaptans, sulfides, amines such as trimethylamine and dimethylamine, phenol, and low class nonsaturate hydrocarbons. Ozone deodorization is effective in emission sources with these odor elements, such as sewages, Kraft pulp mills, and fishmeal processing plants. The chemical formulas are presented. Odor emission sources in the environment in all cases produce complex odors, and ozone oxidation seldom achieves complete deodorization. The process therefore is often combined with a pre- or post-treatment system. The most common combination is with a scrubber. The basic structure of a deodorization system comprises an aeration tank, an ozone aeration tank, an ozonizer, and a neutralization tank with alkaline solution. Various odors were treated by a special deodorization system comprising a scrubber with ozone and alkaline solution, a demister, and an activated carbon layer. The scrubber absorbed amine and other soluble odors, and the liquid interface achieved oxidation decomposition; activated carbon oxidized and adsorbed sulfides and other nonsolubles, and decomposed excess ozone. The results show that an appropriate amount of ozone (5 ppm) could deodorize 98.7 percent of 15 ppm triethylamine, 90-95 percent of 4.5 ppm hydrogen sulfide, and close to 100 percent of 3.2 ppm methylmercaptan. This system was applied to the treatment of exhaust from the trickling filter of a sewage treatment plant. The gas odor concentration can be significantly reduced to by 5 ppm of ozone. (Seigle-FIRL)
W74-13448

DEVICES FOR THE PRE-DILUTION OF SEWAGE AT SUBMERGED OUTFALLS,
Water Pollution Research Lab., Steverage (England).
A. R. Agg, and W. R. White.
Proceedings of the Institution of Civil Engineers, Vol 57, Part 2, p 1-20, March, 1974. 15 fig, 4 tab, 7 ref.

Descriptors: *Model studies, *Waste water treatment, *Mathematical studies, *Outfall sewers, Sewers, Sewage treatment, *Waste dilution.
Identifiers: *Submerged outfalls.

An analysis and arrangement of the parameters governing the dilution of sewage discharged from submerged outfalls is presented. This form of display indicates that the most efficient outfall in terms of maximum dilution at the water surface operates at a densimetric Froude number of unity. Six possible designs for devices to achieve predilution of sewage before discharge from a submerged outfall are also described, and comparative experiments in a physical model to assess their performance are reported. Experiments carried out subsequently on four variations of the most promising device are also compared. The efficiency of the device in increasing dilution at the surface in different depths of water is discussed. (Murphy-FIRL)
W74-13450

METHANE PRODUCTION FROM WASTE,
University Coll. of South Wales and Monmouthshire, Cardiff.
D. A. Stafford.
Effluent and Water Treatment Journal, Vol 14, No 2, p 73-75, 77, 79, February, 1974. 4 fig, 4 tab, 15 ref.

Descriptors: *Methane, *Sewage treatment, *Microbiology, Domestic wastes, Costs, Decomposing organic matter, Anaerobic bacteria, Anaerobic digestion, Organic wastes, Methane bacteria, Biochemistry, *Waste water treatment.
Identifiers: Hydrolysis/gas production, Digestor gas production.

Much of the fundamental microbiology is not yet known for the organisms involved in the production of methane. In order to use domestic sewage as a source of power, research must be done to solve the practical problems of operating a two stage hydrolysis/gas production anaerobic digesting plant. The methane bacteria have the reaction: 4H2 + CO2 yields 2H20 + CH4, common to different species of anaerobic organisms in degrading organic carbon. Discussed are the nutrient requirements of the bacteria, practical applications of anaerobic digestion, inhibitors of digestion gas production, and the financial considerations and market potential for the use of these processes. (Prague-FIRL)
W74-13452

USABLE WATER FROM RAW SEWAGE,
Florida Inst. of Tech., Melbourne. Univ. Center for Pollution Research.
D. D. Woodbridge, L. A. Mann, and W. R. Garrett.
Bull Environ Contam Toxicol. Vol 7, No 2/3, p 80-86, 1972.

Descriptors: *Potable water, Water reuse, *Irradiation, Waste water treatment, Filtration.

Usable water can be obtained by the irradiation process. Use of sewage effluents for industrial purposes would require filtering following the irradiation. Water to be returned to a source stream should be filtered. Filtration treatment can be achieved such that the water will meet potable standards.--Copyright 1973, Biological Abstracts, Inc.
W74-13459

DISPOSAL OF PEACH CANNERY WASTE BY APPLICATION TO SOIL,
North Carolina State Univ., Raleigh.
R. P. Gambrell, and T. C. Peele.
J Environ Qual. Vol 2, No 1, p 100-104, 1973, Illus.

Descriptors: *Peaches, Industrial wastes, Waste water treatment, *Canneries, Ammonium salts, Aeration, *Waste water disposal, Chemical oxygen demand, Nitrates.
Identifiers: Land disposal.

The chemical oxygen demand (COD) of liquid peach cannery waste was significantly reduced by forced aeration of the liquid for 72 hr and was further reduced by the addition of 20 and 200 ppm N from NH4NO3. Eight applications of peach cannery waste were made to soil columns of a sandy clay and a sand subsoil. Soil columns 8.26 cm (3.25 in.) in diameter having lengths of 25.4, 50.8, and 76.2 cm (10, 20, and 30 in.) received the waste at a rate of 2.54 cm/hr (1 in./hr) for 3 hr/application. The effects of soil texture, length of column, plus the addition of NH4NO3 to the waste and CaCO3 to the soil on COD, pH and electrical conductivity of the percolate were evaluated. Generally, as the column length increased, the COD of the percolate decreased. The sandy clay was more effective than the sand in reducing the COD of the percolate. The average reduction for the 50.8 cm (20 in.) columns was 90% for the sandy clay and 70% for the sand. The addition of N to the waste significantly reduced the COD of the percolate while the addition of CaCO3 to the soil had no appreciable effect. The pH of the waste was reduced from an average of 10.9 to about 7.0 by passage through the soils. The pH of both soils was increased considerably by the waste applications and the pH of the sandy clay remained above 7.0 after being leached with distilled water. The percent of aggregates larger than 1 mm was increased by the peach waste applications while the aggregates less than 0.02 mm were not appreciably affected.--Copyright 1973, Biological Abstracts, Inc.
W74-13460

5E. Ultimate Disposal Of Wastes

ECONOMIC COSTS OF WATER QUALITY PROTECTION ON DAIRY FARMS,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
M. Ashraf, and R. L. Christensen.
Water Resources Bulletin, Vol 10, No 2, p 318-328, 1974. 1 fig, 6 tab, 5 ref.

Descriptors: *Costs, *Dairy industry, *Farm wastes, *Waste disposal, Farm management, Land management, Cost analysis.
Identifiers: *Manure disposal, Land spreading.

Estimates of direct investment expenses and the economic implications to the dairy business of adopting alternative manure disposal systems to reduce water pollution are reviewed. Although existing manure disposal technologies include physical conversion, biological processes and conventional disposal, only the land spreading alternative was extensively evaluated. Operating and capital costs of two types of storage, stacking and liquid, utilizing hauling machinery capable of carrying 105, 175 and 320 bushels and 1500, 2100 and 3000 gallons, respectively, were considered. Three alternative time lags between spreading and incorporation into the soil were also evaluated. Results indicate the reduction in net farm income will range from $10-$29/cow with adoption of the stacking system and $33-$51/cow for the liquid system. Small and medium size farms (under 100 cows) may experience a significantly smaller reduction in farm income compared to large farms. The implementation of a disposal system may also affect cropping practices, partially as a result of competition for labor. On small and medium free stall farms the incorporation of a disposal system without plowing could reduce corn acreage by 9%. With plowing down manure 19% of corn acreage could be converted to hay crops. (Schroeder-Wisconsin)
W74-12788

AQUACULTURE IN ALASKA.
Alaska Univ., College. Inst. of Marine Science.
Public Information Bulletin 73-1, June 1973. 19 p. 7 fig.

Descriptors: *Wastes, *Aquiculture, *Recycling, Alaska, Fish farming, Industrial wastes, Fish management, Municipal wastes, Fisheries, Salmon, Organic wastes, Fish hatcheries, Shellfish farming, Heated water, Shrimp, Legal aspects, Administration.
Identifiers: *Waste utilization.

The development of technology to utilize existing feedstuffs and energy, both natural and industrial, in the development of aquaculture in the Alaskan coastal zone are summarized. Several biological species including salmon, six Alaskan and one exotic bivalves, five shrimp species, two edible members of the echinoderm class and a profusion of seaweeds could be compatible with the Alaska ecosystem. Waste products presently produced in Alaska may be recycled for either direct use by these cultivated organisms or used to manufacture bulk feeds for aquaculture or other animal uses. Wastes byproducts including excess heat from generating plants, organic matter from pulp mills, nitrogen discharged as ammonia from the petrochemical industry and treated wastes can be utilized as valued inputs for Alaska's aquaculture. In addition, the new industries could generate year round jobs for the approximately 20,000 underemployed fisheries-related workers along the Alaskan coasts. Institutional questions covering regulation of the new industries and of the waste byproducts are still to be answered. Recommendations include the establishment of demonstration products designed to evaluate the economic justification of processing animal feeds from processed fish wastes and impoundment systems for production of aquacultural seed stocks and market-ready commodities. (Schroeder-Wisconsin)
W74-12791

CONFERENCE ON RECYCLING TREATED MUNICIPAL WASTEWATER THROUGH FOREST AND CROPLAND.
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W74-12869

THE SOIL AS A CHEMICAL FILTER,
Michigan State Univ., Lansing. Dept. of Crop and Soil Sciences.
For primary bibliographic entry see Field 5D.
W74-12873

THE SOIL AS A BIOLOGICAL FILTER,
Ohio State Univ., Columbus. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12874

SITE SELECTION CRITERIA FOR WASTEWATER DISPOSAL -- SOILS AND HYDROGEOLOGIC CONSIDERATIONS,
Pennsylvania State Univ., University Park. Dept. of Geosciences.
For primary bibliographic entry see Field 5D.
W74-12875

RENOVATION OF MUNICIPAL WASTEWATER THROUGH LAND DISPOSAL BY SPRAY IRRIGATION,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-12876

RESTORATION OF ACID SPOIL BANKS WITH TREATED SEWAGE SLUDGE,
Forest Service (USDA), Harrisburg, Ill. Shawnee National Forest.
For primary bibliographic entry see Field 5D.
W74-12879

MICROBIAL HAZARDS IN DISPOSING OF WASTEWATER ON SOIL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12884

VEGETATION RESPONSES TO IRRIGATION WITH TREATED MUNICIPAL WASTEWATER,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W74-12885

ANATOMICAL AND PHYSICAL PROPERTIES OF RED OAK AND RED PINE IRRIGATED WITH MUNICIPAL WASTEWATER,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 5D.
W74-12886

SPRINKLER IRRIGATION SYSTEMS: DESIGN AND OPERATION CRITERIA,
Pennsylvania State Univ., University Park. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-12888

IMPLEMENTING THE CHICAGO PRAIRIE PLAN,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-12892

MUNICIPAL WASTEWATER DISPOSAL ON THE LAND AS AN ALTERNATE OF OCEAN OUTFALL,
Bauer Engineering, Inc., Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-12896

MICHIGAN'S EXPERIENCE WITH UTILIZING THE TEN STATES GUIDELINE FOR LAND DISPOSAL OF WASTEWATER,
Michigan Dept. of Public Health, Lansing. Div. of Wastewater.
For primary bibliographic entry see Field 5D.
W74-12898

RESEARCH NEEDS--LAND DISPOSAL OF MUNICIPAL SEWAGE WASTES,
Forest Service (USDA), Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-12901

WASTE WATER TREATMENT AND SLUDGE DISPOSAL AT THE CESKA KAMENICE PAPER MILL (CISTENI ODPADNICH VOD A LIKVIDACE SEDIMENTU V ZAVODE 25. UNORA V CESKA KAMENICI),
Ceska Kamenice Paper Mill (Czechoslovakia).
For primary bibliographic entry see Field 5D.
W74-12921

WASTEWATER TREATMENT: SLUDGE TREATMENT, UTILIZATION, AND DISPOSAL,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12938

WASTEWATER TREATMENT: LAND DISPOSAL OF WASTEWATER,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 5D.
W74-12940

THE DISPOSAL OF WASTE IN THE OCEAN,
Southern California Coastal Water Research Project, Los Angeles.
W. Bascom.
Scientific American, Vol 231, No 2, p 16-25, Aug., 1974. 13 fig.

Descriptors: *Oceans, *Waste disposal, *Water pollution, Legislation, Pollutants, Radioactive wastes, Halogenated pesticides, DDT, Chlorinated hydrocarbon pesticides, Organic compounds, Polychlorinated biphenyls, Toxins, Marine microorganisms, Water quality standards, Water pollution sources, Oil pollution, Oil spills, Litter, Solid wastes, Heavy metals, Water pollution control, Municipal wastes, Ships, Water pollution effects, Industrial wastes, Aesthetics, Litter.

Contrary to some widely held views, the ocean is the plausible place for man to dispose of some of his wastes. To protect both the land and the sea, in the long run, man must (1) clearly define what is ocean, separating it from inland freshwaters and from harbors and shallow bays, and make laws that are appropriate for each environment, (2) avoid the assumption that anything added to the ocean is necessarily harmful and consider instead what substances might cause damage and eliminate excesses of them, (3) rigorously prohibit the disposal in the ocean of all man-made radioactive materials, halogenated hydrocarbons (such as DDT and polychlorinated biphenyls) and other synthetic organic materials that are toxic and against which marine organisms have no natural defenses, (4) set standards based on water quality that are compatible with what is known about the threshold of damage to marine life, providing a safety factor of at least 10, (5) work to obtain international cooperation in prohibiting ships from disposing of litter or oil and from pumping bilges, (6) set aside ocean areas of deep water and slow current where certain materials can be dumped with minimal damage, (7) require each discharger to make studies to demonstrate how his specific effluent will influence the adjacent ocean, (8) support additional research on the effect of pollutants on the ocean and its life, and (9) anticipate pollutants that may become serious as technology produces new chemical compounds in greater quantities. (Witt-IPC)
W74-12956

AN OBSERVATION OF RAPID THERMOCLINE FORMATION IN THE MIDDLE-ATLANTIC BIGHT,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 5B.
W74-13005

QUARTERLY PROGRESS REPORT STUDIES ON MANAGEMENT OF SELECTED WASTES - JANUARY THROUGH MARCH 1974.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W74-13106

DECONTAMINATION AND DENSIFICATION OF CHOP-LEACH CLADDING RESIDUES,
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W74-13107

WASTE TREATMENT AND HANDLING PROCESSES,
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W74-13108

TRITIUM SEPARATION AND FIXATION,
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W74-13109

SURVEY OF MERCURY USAGE BY AGENCIES OF THE UNITED STATES GOVERNMENT DURING 1971,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-13113

AQUEOUS PROCESSING OF LMFBR FUELS TECHNICAL ASSESSMENT AND EXPERIMENTAL PROGRAM DEFINITION SECTION 4.4 AND 5.4.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-13131

QUARTERLY PROGRESS REPORT - RESEARCH AND DEVELOPMENT ACTIVITIES, WASTE FIXATION PROGRAM, JANUARY THROUGH MARCH 1974.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W74-13132

TECHNICAL AND SOCIAL ASPECTS OF NUCLEAR WASTE DISPOSAL IN WESTERN EUROPE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5D.
W74-13135

HYDROLOGIC PERSPECTIVE OF SURFICIAL WASTE DISPOSAL,
Geological Survey, Tampa, Fla.
For primary bibliographic entry see Field 5D.
W74-13210

MCA ENDORSES WASTE DISPOSAL PROVISIONS.
Chemical and Engineering, Vol 52, No 30, p 5, July 29, 1974.

Descriptors: *Legislation, *Solid wastes, *Waste disposal, Industrial wastes.
Identifiers: *Manufacturing Chemists Association.

Legislation dealing with the safe disposal of solid wastes has received endorsement by the Manufacturing Chemists Association (MCA). Next to toxic substances control legislation, legislative proposals for extending the solid waste act and strict management of hazardous solid wastes rank highest of environmental legislative concerns. Defining product compositions based upon either wastes produced in their manufacture or resource recovery potential is of great importance to the MCA. (Sandoski-FIRL)
W74-13291

INJECTING HIGHLY TREATED SEWAGE INTO A DEEP-SAND AQUIFER,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 5B.
W74-13310

DESIGN, DRILLING AND COMPLETION, OPERATION, AND COST OF UNDERGROUND WASTE DISPOSAL WELLS IN GULF COAST REGION OF TEXAS AND LOUISIANA,
Pollution Control and Waste Disposal, Inc., New Orleans, La.
For primary bibliographic entry see Field 5B.
W74-13340

IMPROVED CONTROL OF RADIOACTIVE WASTE AT HANFORD,
Directorate of Licensing (AEC), Bethesda, Md.
For primary bibliographic entry see Field 5D.
W74-13430

80/80 STANDARD INTO BRISTOL CHANNEL (YEO VALLEY MAIN DRAINAGE SCHEME).
For primary bibliographic entry see Field 5D.
W74-13441

METHANE PRODUCTION FROM WASTE,
University Coll. of South Wales and Monmouthshire, Cardiff.
For primary bibliographic entry see Field 5D.
W74-13452

DISPOSAL OF PEACH CANNERY WASTE BY APPLICATION TO SOIL,
North Carolina State Univ., Raleigh.
For primary bibliographic entry see Field 5D.
W74-13460

5F. Water Treatment and Quality Alteration

THE POLITICAL INFLUENCE OF RESIDENTIAL CONSUMERS ON WATER RATES,
West Virginia Univ., Morgantown. Dept. of Economics.
For primary bibliographic entry see Field 6C.
W74-12786

STUDIES ON THE MICROBIOLOGICAL CHARACTERISTICS OF WATERS USED BY DEFENCE SERVICES IN ASSAM,
A. L. Nair, D. Bhuyan, and H. B. Das.
Armed Forces Med J India. Vol 28, No 2, p 231-249, 1972.

Descriptors: Coliforms, *E. coli, Microbiology, Bacteria, Water pollution effects, *Water treatment.
Identifiers: Assam, India, *Streptococci.

Water samples (138) sent by various Army/Air Force Units were subjected to microbiological analysis which showed 90.3% of the treated and 69% of the untreated water samples to be free from coliforms and fecal streptococci and hence bacteriologically safe for drinking purposes. Escherichia coli was absent in 96.7% of the treated and in 91.1% of untreated samples tested. Only 1 sample showed MPN (most probable number) of E. coli above 100/100 ml of water. Fecal streptococci were absent from 93.6% of the treated and 82.2% of the untreated water samples. Heavy pollution with coliforms appeared in 4.3% of the treated and 13.3% of the untreated samples. Similarly 2.1% of the treated and 11.1% of the untreated samples showed pollution with fecal streptococci, the MPN values for 100 ml being above 100 in all these cases. Maximum values of MPN index recorded for coliforms, E. coli and fecal streptococci were 1100 plus 110 and 460 respectively. High incidence of fecal streptococci was accompanied with high total bacterial load in the samples. Treatment given to raw waters was sufficient for elimination of pollution with fecal indicator bacteria in those cases where such organisms were present.--Copyright 1973, Biological Abstracts, Inc.
W74-12965

THE RELATIONSHIP OF LAND USE TO DOMESTIC SURFACE WATER SUPPLY IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4A.
W74-13047

EFFECT OF OZONATION ON HUMAN ENTERIC VIRUSES IN WATER FROM RHODE ISLAND RIVERS,
Rhode Island Univ., Kingston. Dept. of Animal Pathology.
P. W. Chang.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-236 421 $3.25 paper copy, $2.25 in microfiche. Completion Report, July 1974. 19 p, 2 fig, 11 tab, 1 ref. OWRT B-47-RI(1). 14-31-0001-3933.

Descriptors: *Ozone, *Rhode Island, Enteric bacteria, *Viruses, *Water treatment.
Identifiers: *Ozonation, *Saugatucket River(RI), *Enteric viruses.

Partially purified Poliovirus type 1, 2 and 3; Coxsackie virus type B3 and B5; echovirus type 12 and 29, and adenovirus type 7a were studied for their sensitivity to ozone in either ozone demand-free distilled water or Saugatucket River Water. An ozone sparging rate of one gram per hour was used. Viruses were sampled at various intervals during ozonation and assayed. The different viruses varied in their sensitivity to ozone and ranged from one to 14 minutes for their inactivation. The time required to inactive viruses in river water was in most cases twice as long as that required for the ozone demand-free distilled water.
W74-13056

THE RELATIONSHIP BETWEEN SEWERS, ENVIRONMENTAL POLLUTION AND BACTERIA THAT ARE RESISTANT TO ANTIMICROBIAL AGENTS, (IN AFRIKAANS),
National Inst. for Water Research, Pretoria (South Africa).
For primary bibliographic entry see Field 5B.
W74-13158

DRINKING WATER AS A SOURCE OF LEAD POLLUTION,
Glasgow Univ. (Scotland). Dept. of Materia Medica.
For primary bibliographic entry see Field 5B.
W74-13234

TREATMENT OF WATER OR AQUEOUS SYSTEMS,
Ciba-Geigy Corp., Ardsley, N.Y. (assignee)
For primary bibliographic entry see Field 5D.
W74-13256

SYSTEM FOR MONITORING AND CONTROLLING SUBSTANCES IN FLUID BODIES,
For primary bibliographic entry see Field 7B.
W74-13262

THE IMPORTANCE OF DRINKING-WATER PROGRAMS TO THE TOTAL ENVIRONMENTAL GOAL,
South Carolina State Government, Columbia.
For primary bibliographic entry see Field 5G.
W74-13266

THE HAZARD OF IRON,
Ontario Ministry of the Environment, Toronto. Pollution Control Branch.
For primary bibliographic entry see Field 5B.
W74-13269

VIRUSES--WHAT IS THEIR SIGNIFICANCE IN WATER SUPPLIES,
Environmental Protection Agency, Boston, Mass. Region I.
For primary bibliographic entry see Field 5C.
W74-13272

WATER-TREATMENT-PLANT WASTES DISPOSAL-PART 1,
Malcolm Pirnie, Inc., Paramus, N.J.
G. P. Westerhoff, and M. P. Daly.
Journal of the American Water Works Association, Vol 66, No 5, p 319-324, May, 1974. 6 tab, 4 ref.

Descriptors: *Treatment facilities, *Waste water treatment, Construction, Equipment, Design criteria, Filters, Sludge treatment, Investigations, Polyelectrolytes, Water treatment, Water supply, Potable water.

The Sturgeon Point Water Treatment Plant, located about 15 miles south of Buffalo, New York, treats raw water from Lake Erie and is the principal source of potable water for the Erie County Water Authority. The water authority presently serves about 426,100 persons and is constructing and evaluating primary concentration facilities for achieving a zero discharge of waste water to Lake Erie. The first phase of the program was to construct primary waste water-concentration facilities for interim lagooning until the second phase could be designed and constructed. phase 1 facilities included a 210x60-foot one-story waste water treatment building, two holding basins, two 200x200x10-foot and one 150x200-foot earth lagoons, three 40-foot-diameter clarifier-thickeners equipped with upflow clarifiers, two 15.5-foot high x 7-foot-diameter sludge holding tanks, and various pumps, piping, and valves for transferring the wastes between the various treatment units. These facilities are designed to achieve a degree of liquid-solids separation. The liquid phase of the waste water is returned to the plant raw water; the solids are concentrated and stored in lagoons. (Sandoski-FIRL)
W74-13284

RECOVER ALUM TO REDUCE WASTE-DISPOSAL COSTS,
Metcalf and Eddy, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-13285

THIS WATER FILTER CLEANS ITSELF,
Whitman and Howard, Inc., Boston, Mass.
For primary bibliographic entry see Field 5D.
W74-13332

POLLUTION CONTROL: THE RELATION OF WATER QUALITY PROTECTION TO EXPLORATION FOR AND PRODUCTION OF OIL AND GAS IN THE SOUTHWEST,
Texas Water Commission, Austin.
For primary bibliographic entry see Field 5G.
W74-13342

CHARACTERISTICS OF THE ACTION OF DISTILLED DRIMKING WATER ON THE STATE OF THE GASTROINTESTINAL TRACT, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W74-13374

COMPARISON OF THE EFFECTS OF FLUORIDE DRINKING WATER ON CARIES FREQUENCY AND MOTTLED ENAMEL IN THREE SIMILAR REGIONS OF AUSTRIA OVER A 10-YEAR PERIOD,
K. Binder.
Caries Res. Vol 7, No 2, p 179-183. 1973.
Identifiers: *Austria, *Caries, *Fluoride, Fluorosis, Public health, *Potable water, Water treatment.

There are 2 regions in Austria where the natural F(-2) content of drinking water is within optimal levels (1-2 ppm): A, Carinthia-district center Mallnitz (1.0 ppm F). B, Tyrolia-district center Silz (1.5 ppm F) and Umhausen (1.8 ppm). A 3rd region contains an above optimal level of F(-1): C, Lower Austria-District center Seefeld (3.0 ppm F). An epidemiological survey was carried out regarding the effects of natural F(-1) in drinking water in relation to dental caries and fluorosis. Experimental and control groups in about equal numbers, were present in each of the 3 districts. The experimental groups consisted of children living in houses connected with the municipal water supply, the F(-1) content of which remained constant, within a variation of plus or minus 0.20 ppm F, during the 10-yr period. The difference between the DMFT (decayed-missing-filled teeth) values of the test groups and the corresponding controls remained practically the same during the test

period but caries frequency increased in all groups to a lesser degree in Mallnitz than in Silz and Umhauser. Whereas 10 yr ago the children of 1.0 ppm F) had higher DMFT than in B(1.5 ppm F) and (1.8 ppm F), the conditions are now reversed. The reason for the increase of DMF numbers in all groups is the increase of sugar consumption in B compared with A. The influence of oral hygiene and nutrition could be responsible for the effect that in 1969 the children of A had better teeth than the children of B. Although the children of C consumed frequent in between snacks, neglected their teeth badly, never used a toothbrush and had very few cavities filled, the high level of F(-1) in the drinking water resulted in figures comparable to those of B 10 yr ago, i. e. lower DMF rates and higher mottling rates.--Copyright 1973, Biological Abstracts, Inc.
W74-13398

USABLE WATER FROM RAW SEWAGE,
Florida Inst. of Tech., Melbourne. Univ. Center for Pollution Research.
For primary bibliographic entry see Field 5D.
W74-13459

DETERMINATION OF NITRATE NITROGEN IN DRINKING-WATER BY CADMIUM-COPPER REDUCTION, (IN JAPANESE),
Aichi Prefecture Inst. of Public Health, Nagoya (Japan).
For primary bibliographic entry see Field 5A.
W74-13498

5G. Water Quality Control

STATE-COUNTY INTERAGENCY PROCEDURES FOR IMPOSING ENVIRONMENTAL QUALITY CONTROLS ON WATER-ORIENTED DEVELOPMENT ACTIVITIES,
Whittenburg, Vaughan Associates, Inc., Landover, Md.
W. S. Vaughan, Jr., H. A. Blanchard, and A. S. Mavor.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 299, $4.75 paper copy, $2.25 in microfiche. Completion Report, July 1974. 94 p, 6 fig, 7 tab, 50 ref. OWRT C-4262(9041)(1).

Descriptors: *Governmental interrelations, *Interagency cooperation, *Environmental control, *Local governments, *State governments, *Regulation, Coordination, Decision making, Governments, Institutions, Permits, Control, *Maryland, Wetlands, City planning, Coastal structures, Inland waterways, Water pollution control.
Identifiers: *Anne Arundel County(Md), Environmental procedures, Environmental control criteria.

Project purpose was to describe and evaluate the system of agencies, criteria and procedures which control water-oriented development in Anne Arundel County, Maryland. Environmental-quality oriented constraints which serve to counter pressures for development of the waterfront were emphasized. Two main categories of development were examined: (1) construction of piers and bulkheads involving dredging, filling and spoil disposal; and (2) planning of large-tract waterfront subdivisions involving water appropriation, sewerage systems, waterway construction, flood plain and open space preservation, grading and storm water runoff, and community marinas. County, State and Federal agencies involved in the control system are identified and their functions described. Control criteria imposed by each agency are listed and compared. Procedural steps for processing development applications are presented in flow diagrams. The case study method was the principal source of descriptive information, supplemented by interviews with developers, conservationists and control agency personnel, and by reviews of Federal, State and local laws, regulations and ordinances. Analysis of the description revealed considerable redundancy in the criteria imposed by the control agencies and a confusion among developers as to how to proceed through the three-layered review process. Means to improve system efficiency are recommended.
W74-12751

DISPOSAL OF HEATED WATER THROUGH GROUNDWATER SYSTEMS - VOL. I: TECHNICAL AND ECONOMIC FEASIBILITY,
Kansas Univ., Lawrence. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W74-12753

DISPOSAL OF HEATED WATER THROUGH GROUNDWATER SYSTEMS, VOLUME II, USER'S MANUAL NUMERICAL SIMULATION OF FLUID FLOW AND HEAT TRANSFER IN GROUNDWATER SYSTEMS,
Kansas Univ., Lawrence. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W74-12754

POLLUTION MANAGEMENT IN THE COASTAL STATES,
Coastal States Organization, Savannah, Ga.
T. H. Suddath.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Resenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 42-47.

Descriptors: *Continental margin, *Coasts, *Management, *Pollution abatement, State governments, Water pollution control, Air pollution, Natural resources, Recreation, Great Lakes, Institutions, Regulation, Planning, Administration, Decision making.
Identifiers: *Coastal zone management.

Pollution management in coastal states involves a delicate balancing of diverse user goals in the defined coast zone. The Coastal Zone Organization, which is composed of representives from coastal and Great Lakes states, has sought to facilitate debate on the appropriate coastal zone management goals and implementation tools. Issues raised by the organization include how strongly should controls be exercised; how should management and regulatory responsibilities be divided among levels of government; how should each state's participation be organized and how far inland and seaward should planning and controls be extended. In developing a state organization the stress is that all interests must be represented. A four step hierarchy is suggested: After the state defines its coastal zone it should be placed under the jurisdication of a Coastal Zone Management Authority; reporting to the authority would be local planning commissions. A state Environmental Protection Agency would be charged to assess environmental impacts, funnel environmentally related funding, and act as an appeal board for local residents. The final organizational stage would be a state Environmental Quality Council whose duties would include adjudication and recommendation to the governor courses of action where disputes occur with local interests and the federal government. (Schroeder-Wisconsin)
W74-12767

THE THRESHOLD OF ENVIRONMENTAL REASON,
Corps of Engineers, Atlanta, Ga. South Atlantic Div.
For primary bibliographic entry see Field 6G.
W74-12768

FOOD AND DRUG ADMINISTRATION GUIDELINES FOR CONTAMINANTS IN FISHERY PRODUCTS,
Food and Drug Administration, Washington, D.C. Bureau of Foods.
A. C. Kolbye, Jr.
In: Proceedings of the 24th Annual Session of Gulf and Caribbean Fisheries Institute, November 1971, Rosentiel School of Marine and Atmospheric Sciences, University of Miami, Coral Gables, Florida, p 81-84.

Descriptors: *Federal government, *Regulation, *Commercial fishing, Mercury, Water pollution, Public health, Shellfish, Standards, Fish handling facilities, Canneries, Pesticide residues, Hazards, Polychlorinated biphenyls, Heavy metals.
Identifiers: *Seafoods.

Traditionally the Food and Drug Administration's approach to fish products has centered on microbiologic quality, generally in-plant sanitation. Unlike other protein sources however, fish are grown and harvested in a relatively uncontrolled environment. Thus FDA's approach has had to expand from in-plant examination to an active fresh-water pesticide analysis program. In Fiscal Year 1971, 600 fish samples were analyzed for pesticides with almost all containing residual level of DDT or its analog; 346 of the samples contained PCB (1254) an industrial contaminant. In addition to these programs the FDA initiated a compliance program in 1970 to determine the extent of mercury contamination of fishery products. Examination of the canned tuna market between Dec. 16, 1970 and Feb. 1, 1971 revealed only 4% exceeded existing guidelines. Extention of the sampling program revealed that less than 5% of swordfish samples were within FDA's 0.5 ppm guideline. Further survey of salt water fish indicated that while their mean mercury level is low, snapper, bonito and mackerel levels were likely to exceed FDA's guidelines. Development of these guidelines is also reviewed. Guidelines are generally developed based on research considering the impact of mercury on humans. (Schroeder-Wisconsin)
W74-12770

INDUSTRY ACTIVITIES IN RESPONSE TO THE HEAVY METALS PROBLEM IN SEAFOODS,
National Fisheries Inst., Inc., Washington, D.C.
L. J. Weddig.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 85-92. 20 ref.

Descriptors: *Commercial fishing, *Heavy metals, *Regulation, Water pollution, Public health, Marketing, Standards, Mercury, Fish handling facilities, Economics.
Identifiers: *Seafoods, Tuna, Swordfish, Food and Drug Administration.

After the 1970 discovery that a variety of fresh water and marine fish contained mercury levels in excess of FDA guidelines, and Food and Drug Administration and the fisheries industry took a number of steps to reduce the hazard and economic loss. The tune industry immediately established procedures to segreate contaminated fish, resulting in only a small inventory loss. The contaminated swordfish problem was not so easily salvaged. FDA samples showed problem included: (1) notification to foreign producers to cease shipping (95% of all swordfish are imported); (2) shipments on the water were either returned to home ports or held at the port-of-entry for testing; and (3) testing was begun on the 2-4 million pound cold storage inventory. In the end most of the product exceeding guideline specifications was returned to Japan. Disposal cost for the industry were estimated to exceed $1 million. Besides these 'bail-out' programs, long range programs have

been developed to (1) assess the extent of heavy metal in fishery products; (2) source of the heavy metal and it's impact on humans and (3) to inform the public of the industry's good faith attempts. (Schroeder-Wisconsin)
W74-12771

GUIDELINES FOR DEVELOPING OR REVISING WATER QUALITY STANDARDS, UNDER THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972.
Environmental Protection Agency, Washington, D.C. Div. of Water Planning.
EPA Report, January 1973, Amended April 1973, 39 p.

Descriptors: *Water quality standards, *Regulation, *Legislation, Water quality control, Legal aspects, *State governments, *Water policy.

Contents consist of definition of Waters covered by the act; Objective, goals and policies; Policy guidelines including stream use classification policy, Implementation plan policy, Water quality criteria policy, Antidegradation policy, and General policies, i.e., minimum acceptable standards, interstate consistency, etc.; and Legislative requirements including interstate standards, existing intrastate standards, and new intrastate standards. (See also W74-12798) (EPA)
W74-12797

WATER QUALITY STRATEGY PAPER, SECOND EDITION, A STATEMENT OF POLICY FOR IMPLEMENTING THE REQUIREMENTS OF THE 1972 FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS AND CERTAIN REQUIREMENTS OF THE 1972 MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT.
Environmental Protection Agency, Washington, D.C. Div. of Water Planning.
EPA Report, March 15, 1974, 82 p.

Descriptors: *Water quality standards, *Legislation, *Federal Water Pollution Control Act, *Regulation, *Comprehensive planning, Budgeting, Government finance.

This second edition of the Water Strategy has been prepared for use and review by Federal, State, and local government officials, and for the information of the public. It reflects the final decisions on the Federal Government's FY 1975 budget. Major changes to the 1973 edition have been made, and the discussion has been broadened to include several new areas of program activity. The principal emphasis of the Strategy is on the implementation of the Federal Water Pollution Control Act, for which EPA has the major Federal responsibility. EPA's role under the Marine Protection, Research, and Sanctuaries Act in regulating ocean dumping is also included, however. Specific programs governing the protection of public water supplies are not addressed. (See also W74-12797) (EPA)
W74-12798

HYDRODYNAMIC REGIMES OF SUBSURFACE RETURN FLOW,
Howard Univ., Washington, D.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W74-12843

COSTS OF LAND SUBSIDENCE DUE TO GROUND WATER WITHDRAWAL,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 4B.
W74-12867

FINANCING MUNICIPAL WASTE WATER TREATMENT FACILITIES, INCLUDING LAND UTILIZATION SYSTEMS,
Environmental Protection Agency, Washington, D.C. Div. of Municipal Waste Water Programs.
For primary bibliographic entry see Field 5D.
W74-12890

FOREST SERVICE POLICY RELATED TO THE USE OF NATIONAL FOREST LANDS FOR DISPOSAL OF WASTEWATER AND SLUDGE,
Forest Service (USDA), Washington, D.C. Div. of Watershed Management.
For primary bibliographic entry see Field 5D.
W74-12899

SPRAY IRRIGATION--THE REGULARTORY AGENCY VIEW,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Ground Water Quality Management Unit.
For primary bibliographic entry see Field 5D.
W74-12900

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED BYRON STATION UNITS 1 AND 2, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-12902

THE FLOW OF MERCURY IN SOCIETY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-12919

MAN BITES DOG: THE TALE OF HOW A PULP MILL WAS RESCUED FROM BEING POLLUTED TO DEATH,
Alliance Paper Mills Ltd., Merritton (Ontario).
A. E. H. Fair.
Pulp and Paper Magazine of Canada, Vol 75, No 4, p 35, April 1974.

Descriptors: *Industrial water, *Pulp wastes, Pulp and paper industry, *Clogging, Equipment, *Water supply, Water resources development, *Hydroelectric plants, *Canals, Surge tanks, Hydraulic structures, Engineering structures, Penstocks.

When the water supply of Alliance Paper Mills dwindled in the 1930's, owing to diversion of shipping canal waters to a hydroelectric power plant, increasing amounts of previously deposited fibrous sludge plugged a gravity filter and passed into food-wrapping paper. Freshwater flow from a new canal was secured for papermaking with permission from the power company to tap the base of a surge tank at the end of a penstock. (Brown-IPC)
W74-12955

FEDERAL ASSISTANCE PROGRAMS FOR WATER POLLUTION CONTROL TECHNOLOGY DEVELOPMENT,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
F. G. Hurtubise, and A. R. Townshend.
Paper presented at 1974 Annual Conference, Pollution Control Association of Ontario, May 1-3, 1974. Toronto, Ontario. Published June 1974. 30 p, 10 tab.

Descriptors: *Pollution abatement, Programs, *Grants, Governments, *Federal government, *Administrative agencies, *Canada, *Research and development, Projects, Planning, Financing, Treatment facilities, Waste water treatment, Waste treatment, Procurement, Contracts, Contract administration.

The Canadian Federal Government offers several assistance programs to encourage universities, research centers, consultants, industries, and municipalities to conduct research and development on improved wastewater treatment processes and equipment. An outline is presented of such programs administered by Environment Canada, CMHC (Central Mortgage and Housing Corp.), the National Research Council of Canada, and other agencies. Program expenditures and typical funded projects are illustrated. The role of the Science Procurement Sector, Department of Supply and Services in coordinating unsolicited R and D proposals and in obtaining contract work for government agencies is explained. (Brown-IPC)
W74-12959

SUMMERTIME ARTIFICIAL AERATION INCREASES WINTER OXYGEN LEVELS IN A MICHIGAN LAKE,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
A. Fast.
Prog Fish-Cult. Vol 35, No 2, p 82-84, 1973. Illus.

Descriptors: *Aeration, Fish, Fishkill, Lakes, Winterkilling, Summer, *Oxidation, Oxygen, Michigan, Microorganisms, *Mortality.
Identifiers: Artificial.

Three mo. of summertime artificial aeration using compressed air resulted in a large increase in winter O2 concentrations during ice cover. This increase is attributed to a more thorough oxidation of organic matter with a resultant decrease in the winter O2 consumption rate, and a larger reserve of O2 at the time of ice cover. Both of these conditions are attributed to artificial aeration which may prevent winterkill of fishes.--Copyright 1973, Biological Abstracts, Inc.
W74-12968

DYNAMIC ANALYSIS AND OPTIMAL FEEDBACK CONTROL SYNTHESIS APPLIED TO BIOLOGICAL WASTE TREATMENT,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W74-13026

A STUDY OF HOW WATER QUALITY FACTORS CAN BE INCORPORATED INTO WATER SUPPLY ANALYSIS,
Ernst and Ernst, Washington, D.C.
J. M. Greene.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-782 870, $6.25 in paper copy, $2.25 in microfiche. Army Engineer Institute for Water Resources, Fort Belvoir, Va, Contract Report 74-2, July, 1973. 3 vol, 164 p, 7 fig, 8 tab, 50 ref. Contract No DACW71-72-C-0053.

Descriptors: *Water supply development, *Water quality, *Water demand, *Linear programming, Optimization, Methodology, Standards, Pollution abatement, Water quantity, Marginal cost, Equations, Resource allocation, Planning, Systems analysis, Mathematical models.
Identifiers: *Economic analysis, *Cost minimization, Constrained utility-maximization, Constrained profit-maximization, Production functions, Water quality upgrading, Water quality index, Comparative statistics, Equilibrium analysis.

Presented is a three-volume study which examines the feasibility of embedding quality parameters explicity in water supply analyses. A microeconomics approach using constrained optimization is employed. Volume One presents water supply function conceptual theory and methodology by means of classical economics model (CEM) derivation of a treatment plant's marginal cost function with a water quality-related

parameter incorporated explicitly. A linear programming model (LPM) is developed to demonstrate how it is possible to depict internal behavior by a water-using producer, who can alter his 'effective' supply by upgrading lower quality water to higher acceptable quality. Volume Two is the empirical implementation of Volume One. For the CEM, actual data are used to help estimate a sample cost function, while dummy data enable demonstrating the sensitivity capabilities of the LPM. Both models permit estimating costs of removing water contaminants. Volume Three gives the conceptual justification for water demand functions (for consumers and producers) with explicit quality parameters incorporated. Hypothetical examples are given and combined with Volume Two's CEM to examine by means of comparative statics analysis the sensitivity of 'marginal revenue-marginal cost' equilibrium to quality parameter shifts. Throughout the study, a measure of turbidity concentration is used as the illustrative quality parameter, but the conceptual feasibility of alternative forms is discussed. (Bell-Cornell)
W74-13030

THE RELATIONSHIP OF LAND USE TO DOMESTIC SURFACE WATER SUPPLY IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4A.
W74-13047

POWERS OF THE STATE OF KENTUCKY IN IMPLEMENTING AN EFFLUENT TAX AS A PART OF AN INTERSTATE OHIO RIVER BASIN WATER POLLUTION CONTROL PROGRAM,
Kentucky Univ., Lexington. Water Resources Research Inst.
A. L. Morse.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-236 407, $4.25 paper copy; $2.25 microfiche. Research Report No 76, September 1974. 57 p, 151 ref. OWRT A-053-KY(1). 14-31-0001-4017.

Descriptors: Legislation, Legal aspects, Financing, Water law, Water policy, Water resources development, *Kentucky, Water pollution control, Regulation, *Pollution taxes(Charges), Available water, Institutional constraints, Surface water availability.

Problems and solutions involved in financing and regulating water quality control are described. The purpose is to record some of the major problems confronting those who legislate water quality, those who espouse technological answers, and those who see the problem in terms of economic solutions. The limits placed by political and institutional constraints on solutions to these problems are frequently not understandable. Within this report are contained separate investigations: a study of federal-interstate relations and the interstate compact; a study of Kentucky's common law approach to water rights; a study of financing water quality under Kentucky statutes; and a summary and analysis. Each of these areas touches on problems involved in the planning process; in this context, the following problems are considered: (1) The availability of water. (2) Water and economic development. (3) Water and the environment. (4) Responsibilities for water resources development. (5) Legal framework for development. (6) Financing water resource development. (7) Political and institutional constraints. (Grieves-Kentucky)
W74-13051

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
For primary bibliographic entry see Field 5D.
W74-13071

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
For primary bibliographic entry see Field 5D.
W74-13072

EFFICACY OF SOME METHODS CONTROLLING LEECHES IN WATER,
Wyzsza Szkola Rolnicza, Lublin (Poland). Zaklad Chorob Ryb.
M. Prost, M. Studnicka, and J. Niezgoda.
Aquaculture, Vol 3, No 3, p 287-294, June 1974, 1 tab, 6 ref.

Descriptors: *Pesticides, *Animal parasites, Chemcontrol, Hydrogen ion concentration, Ammonia, Calcium hydroxide, Larvae, Fish disease, Lime, Laboratory test, Water pollution contol.
Identifiers: *Leeches, Desiccation, Quicklime, 'Neguvon'-Bayer, Piscicola geometra.

Experiments were carried out on the influence of quicklime, ammonia water, 'Neguvon'-Bayer and desiccation on the vitality of leeches. The efficacy of quicklime depends on its CaO content, on the dose of this compound, and above all, on the pH of calcium hydroxide formed by mixing quicklime with water. The borderline value in this case is pH=8.6. Quicklime containing 99% CaO proved the most effective in destroying mature leeches and their cocoons; at the concentration of 250 ppm, it produces a pH higher than 8.6. In acceptable doses, ammonia water is ineffective while 'Neguvon'-Bayer is useful against mature leeches only. Under laboratory conditions, drying up kills leech larvae in 24 hours. This is therefore a radical means of combatting these parasites. (Katz)
W74-13096

THE INTERAGENCY CONFERENCE ON THE ENVIRONMENT - A POST-CONFERENCE SURVEY,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 6G.
W74-13118

TRANSURANIC SOLID WASTE MANAGEMENT RESEARCH PROGRAMS - QUARTERLY REPORT, OCTOBER-DECEMBER 1973.
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5B.
W74-13120

NEW ENERGY TECHNOLOGY RESEARCH AND DEVELOPMENT: A RATIONALE FOR SETTING PRIORITIES,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 6B.
W74-13123

EFFLUENT CONTROL IN FUEL REPROCESSING PLANTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5D.
W74-13127

CHEMICAL ENGINEERING DIVISION WASTE MANAGEMENT PROGRAMS QUARTERLY REPORT, OCTOBER-DECEMBER 1973,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5D.
W74-13128

A PROPOSED INTERIM STANDARD FOR PLUTONIUM IN SOILS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5B.
W74-13136

HABITATS OF SMALL MAMMALS AT WHITESHELL NUCLEAR RESEARCH ESTABLISHMENT,
Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
For primary bibliographic entry see Field 5C.
W74-13137

RECLAMATION STUDIES ON BLACK MESA,
Arizona Univ., Tucson. Dept. of Watershed Management.
J. L. Thames, and E. J. Crompton.
Progressive Agriculture in Arizona. Vol 26, No 1, p 14-16, January-February, 1974. 4 fig.

Descriptors: *Strip mines, *Revegetation, *Mine wastes, *Reclamation, *Soil physical properties, Small watersheds, Reclamation, Runoff, Surface water, Soil moisture, Water yield, Erosion, Sedimentation, Soil properties, Arid lands, *Arizona, Coal mines.
Identifiers: *Black Mesa(Ariz).

A research project was initiated to obtain hydrologic and soil material data in areas mined for coal in order to develop mining practices favorable to surface mine reclamation. Water and its conservation was determined to be the critical factor for determining the success or failure of a reclamation project in the arid environment. The intended goal in the Black Mesa area is to develop the reclamation sites into range land for sheep. Two experimental watersheds were used, one on recontoured mine land, and another on nearby undisturbed land. Both were instrumental to monitor various hydrologic parameters. Preliminary results show that the mine soil's lack of structure caused some puddling and surface crusting; however, the mine soil showed a high hydrologic potential and adequate nutrient level, particularly due to its great depth, for good range production. (Mastic-Arizona)
W74-13144

DRAINAGE AND LAND RECLAMATION IN THE LOWER MESOPOTANIAN PLAIN,
International Agricultural Centre, Wageningen (Netherlands).
For primary bibliographic entry see Field 4A.
W74-13148

SUMMARY OF WATER QUALITY STANDARDS FOR THE INTERSTATE WATERS OF IOWA,
Environmental Protection Agency, Washington, D.C.
Available NTIS, Springfield, Va 22161 as PB-230 284, Price $3.75 printed copy; $2.25 microfiche. Environmental Protection Agency, Water Quality Standards Summary Report EP 1.29 (Iowa Water Pollution Control Commission Io-9), June 1972. 27 p, 3 fig, append.

Descriptors: *Water pollution control, *Iowa, *Water Quality Act, Federal Water Pollution Control Act, Waste treatment.

Water quality standards adopted by Iowa for its interstate waters were submitted to the Department of the Interior in May 1967. On January 16, 1969, the Secretary of the Interior approved the standards. The standards consist of three major components: designation of the uses which interstate waters are to serve, specification of narrative and numerical criteria to protect and enhance water quality, and specification of a plan of implementation and enforcement, which includes treatment and control requirements for municipal, industrial and other wastes discharged to or affecting interstate waters. (Knapp-USGS)
W74-13185

INFLUENCE OF RECHARGE BASINS ON THE HYDROLOGY OF NASSAU AND SUFFOLK COUNTIES, LONG ISLAND, NEW YORK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-13206

INTERIM EFFLUENT GUIDANCE FOR NPDES PERMITS,
Environmental Protection Agency, Washington, D.C. Permit Program Div.
R. B. Schaffer.
Available from NTIS, Springfield, Va 22161 as PB-227 001, Price $5.25 printed copy; $2.25 microfiche. 1973, 122 p.

Descriptors: *Water pollution control, *Pollution abatement, *Permits, Regulation, Industrial wastes, Waste water treatment.

General guidance is given for permit applications to the Environmental Protection Agency for all industrial categories of effluent discharges. The guidance documents were developed to cover, as specifically as possible, the identified industrial categories. Permits are to be written with limitations in terms of mass of each pollutant per day excepting in certain industries (such as mining operations and utility discharges) where wastewater generation is not related to production levels. (Knapp-USGS)
W74-13214

P, N:P STANDARDS FOR HAWAIIAN STREAMS,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W74-13217

ARE THE GREAT LAKES THREATENED,
Canada Centre for Inland Waters, Burlington (Ontario).
J. P. Bruce, and G. F. Gabriel.
Journal of the American Water Works Association, Vol 66, No 5, p 298-301, May 1974. 4 fig, 1 ref.

Descriptors: *Great Lakes, *Water pollution, *Water utilization, *Water demand, *Water pollution control, Eutrophication, Lakes, United States, Canada, Treaties, Water supply, Water sources, Water quality, Water quality standards, Water quality control, Water purification, Pollution abatement, Environmental effects, Water pollution treatment, Water treatment, Adoption of practices, Public benefit, Recreation, Economic aspects.

Although the water of most of the Great Lakes is still of good quality many problems have developed in near shore areas. More extensive implementation of pollution control measures on this lake system should be a matter of urgent concern. The lakes are used for many purposes including public and industrial water supplies, recreation, shipping, power production and commercial fishing. Some of the more important problems facing the Great Lakes are eutrophication, organic contamination, presence of trace metals, oil pollution and bacterial contamination. The water quality of the Great Lakes is indeed threatened for many uses, including community water supply uses. However a recently signed agreement between Canada and the United States, which established jointly agreed water quality objectives and control programs, should resolve many of the problems if properly executed. (Ritchie-Florida)
W74-13218

METHODS AND PROBLEMS OF ESTIMATING WATER-QUALITY BENEFITS,
Environmental Protection Agency, Washington, D.C. Office of Research and Development.
F. H. Abel, and D. P. Tihansky.
Journal of the American Water Works Association, Vol 66, No 5, p 276-281, May, 1974. 20 ref.

Descriptors: *Water quality, *Water quality control, *Cost-benefit analysis, *Cost-benefit theory, Costs, Economics, Cost-benefit ratio, Feasibility, Project planning, Social aspects, Environmental effects, Water policy, Water supply, Water management(Applied), Planning, Water resources development, Comprehensive planning, Natural resources.

The demand for water quality improvement programs necessitates the development of methods for estimating benefits of such programs against their costs. There are several methods in use that deal with both tangible and intangible benefits. In some cases these benefits outweight any cost. All of these procedures are part of a benefit-cost analysis. Pollution is the result of man's activities as they affect the quality of water. Methods of estimating benefits include dose-response relationships, market assessments, willingness to pay surveys and variations of the Delphi technique. There are two primary ways to measure costs: the firm-accounts approach and the engineering approach. Hopefully these techniques will yield solutions with maximum net socioeconomic benefits. (Ritchie-Florida)
W74-13219

THE ENVIRONMENT AND WATER-RESOURCE DEVELOPMENT,
National Wildlife Federation, Washington, D.C.
L. S. Clapper.
Journal of the American Water Works Association, Vol 66, No 5, p 291-292, May 1974. 1 photo, 2 ref.

Descriptors: *Environment, *Environmental effects, *Water resources, *Water resources development, *Planning, Conservation, Organizations, Water pollution, Water pollution control, Project planning, Ecology, Legal review, Water demand, Water management(Applied), Water quality, Water supply, Adoption of practices, Comprehensive planning, Water law, Water policy.

Those who are interested in preserving the environment do not necessarily have to be in conflict with those who want to develop resources. Good planning, public participation, and environmental awareness can enhance the environment without halting progress. Currently, the National Wildlife Federation (NWF) is involved in a number of lawsuits to stop the development of certain water-resource development projects. To NWF, conservation does not necessarily mean 'pure preservation', even though it seems water-development projects should stand on its own merits, with benefits being weighed against costs, and including both economic and probable adverse impacts on the environment. NWF has also recommended the incorporation of the concept of life-cycle planning. Such planning would require quantitative evaluation of environmental impact during the planning, exploration, construction and operation of any water-resource project. (Ritchie-Florida)
W74-13221

PROPOSITION ONE--FOR NEW YORK'S ENVIRONMENT,
D. Sive, F. Demeree, and L. Robbins.
Environmental Quality News (Supplement to the Conservationist), August-September, 1972. 4 p.

Descriptors: *New York, *Legislation, *Bond issues, *Public benefits, *Pollution control, Water law, Land management, Water quality control, Natural resources, Public lands, State governments, Feasibility, Financial feasibility, Pollution abatement, Recycling, Solid wastes, Air pollution, Water pollution, Water pollution control, Political aspects, Government finance.

To continue the financing of its environmental programs, New York proposed a $1.15 billion bond issue, which is known as Proposition One. The 1972 Environmental Bond Coalition advocates Proposition One because the bond issue would provide assistance to communities in constructing new sewage treatment facilities and would augment the 1965 Bond Act. The 1965 Bond Act was a joint federal-state project. Proposition One, however, is entirely a state project. The new bond issue would provide money to abate air pollution from public sources such as schools, hospitals, prisons and municipal incinerators. None of the money would alleviate pollution from private industry or automobiles. Proposition One would provide money to aid communities in designing and constructing solid waste recycling facilities. Finally, Proposition One could provide money to acquire forest preserve lands, fresh water and marine wetlands, unique natural areas, access to new fishing and recreation areas, and urban land for city parks. This part of the Proposition is eligible for federal matching funds. (Barnes-Florida)
W74-13222

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38 No 98, p 13528-13540, May 28, 1973.

Descriptors: *Regulation, *Federal Water Pollution Control Act, *Administration, *Adoption of practices, Administrative agencies, Decision making, Planning, Coordination, State government, Federal government, Permits, Water policy, Navigable waters, Oceans, Federal reservations, Water law, Conservation, Water resources development, Construction Political aspects, Legal aspects, Environmental effects, Environmental sanitation, Notice, Contiguous zone.
Identifiers: *Administrative regulations.

The Environmental Protection Agency proposed policies and procedures for the National Pollutant Discharge Elimination System pursuant to the Federal Water Pollution Control Act. Written comments on the proposed rules were invited and some comments have been adopted or substantially satisified. The permit program on the state level should not be inconsistent with the guidelines for state permit programs. The regulations prescribe the policy and procedures to be followed in connection with applications for federally issued permits authorizing discharges into the navigable waters, the waters of the contiguous zone and the oceans, during the periods the Administrator is authorized to issue such permits. Similar regulations were also issued to cover discharges of any agency of the federal government. The regulations do not prescribe policy or procedures for the issuance of permits by states under programs approved by the Administrator. The requirement that joint federal-state agreement be published in the Federal Register has been deleted. Now any agreement consistent with the regulations is valid without publication. (Sperling-Florida)
W74-13228

METHODS TO EXPEDITE ENVIRONMENT PROTECTION: INTERNATIONAL ECOSTANDARDS,
Food and Agriculture Organization of the United Nations, Rome (Italy).
P. Contini, and P. H. Sand.
American Journal of International Law, Vol 66, No 1, p 37-59, 1972. 128 ref.

Descriptors: *international law, *Treaties, *Adoption of practices, *Environmental control, *Standards, Federal government, Environmental effects, Environment, International commissions, Water quality standards, Administration, Water

pollution, Water quality, Federal jurisdiction, Radioactive wastes, Industrial wastes, Oil pollution, Pollution abatement, Regulation, Water law, Air pollution.

The traditional treaty making process is inadequate for implementing international ecostandards. The ratification process is so long that the proposed standards are out of date before they take effect. Alternative approaches to the traditional treaty making process do exist and are used in other fields such as the Universal Postal Union and the International Civil Aeronautics Organization. In the alternative form the actual environmental protection standards are in the form of appendices formulated by scientists, not lawyers. The body of the treaty contains procedure for adoption of new standards and other means for arriving at agreement. There are basically three types of standards in such treaties, mandatory standards, and potentially mandatory standards. Potentially mandatory standards are the most common. This type provides for a period in which a participating nation may opt to dissent and not be bound, but upon expiration of the period, non-dissenters will be bound by the provisions. Once having agreed upon standards, each nations is independent to statutorily implement those ecostandards in any way it desires. (Barnes-Florida)
W74-13229

YOUR LAKE INSURANCE POLICY,
9 Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
For primary bibliographic entry see Field 6F.
W74-13231

THE CONFLICT BETWEEN CONSUMPTION AND POLLUTION,
Stanford Univ., Calif.
R. N. Fleming, and R. H. Pantell.
IEEE Transactions on Systems, Man, and Cybernetics, Vol SMC-4, No 2, p 204-208, March, 1974. 7 fig, 5 ref.

Descriptors: *Water consumption, *Water pollution control, *Mathematical models, *Computers, Planning.
Identifiers: *Food consumption, Steady-state solution, Critical parameters.

The United States is concerned about controlling pollution without excessive decreases in consumption. In this correspondence a technical relationship between consumption and pollution is defined. A utility function indicates the manner in which consumption should vary with time so as to maximize utility. It is assumed that a specified pollution level is to be achieved at the termination of a given planning period, and the problem is to obtain the optimum path of this objective. As a special case, a steady-state solution is obtained, which specifies the most desirable constant levels of consumption and pollution. Critical parameters athat enter into this solution are the discount (or appreciation) rate for the future, the decay lifetime for the pollutant, and the rate of change of pollution generation with respect to consumption. In addition, a closed-form solution is obtained for the low-pollution case, which indicates that the optimum consumption function decreases with increasing time. Computer solutions are given for the general case with several different values of critical parameters. (Prague-FIRL)
W74-13236

OIL/WATER SEPARATION ACCELERATION MEDIA,
Oil Mop, Inc., New Orleans, (assignes).
H. M. Rhodes.
United States Patent 3,810,832. Issued May 14, 1974. Official Gazette of the United States Patent Office, Vol 922, No 2, p 593, May, 1974. 1 fig.

Descriptors: *Separation techniques, *Patents, Flow, Equipment, Filaments, *Oil wastes, Oil pollution, *Pollution abatement, *Waste water treatment.
Identifiers: *Polypropylene, Acceleration media, Flow vector, Linear flow, Oil-water separation.

Media is directed to an apparatus for accelerating the separation of oil from oil/water mixtures. This brings the oil to the surface over a short a linear distance as possible in a linear flow of a mixture of oil and water. The process is accomplished by directing the oil/water mixture through a barrier of filaments of polypropylene arranged across the path of the mixture flow; the barrier is anchored at its base at the bottom of the fluid confining means by an API oil separator, a ditch, or a canal. The free ends of the strips of polypropylene are directed upward, forming an inclined plane up which the oil droplets amalgamate. These are assisted by the buoyancy of the oil and the force flow vector of the mixture passing through the fluid confining means. (Prague-FIRL)
W74-13243

ENVIRONMENTAL CONTROL EQUIPMENT.
For primary bibliographic entry see Field 5D.
W74-13263

ENVIRONMENTAL ASSESSMENT OF WATER-SYSTEM IMPROVEMENTS,
East Bay Municipal Utility District, Oakland, Calif.
D. G. Larkin, and W. F. Anton.
Journal of the American Water Works Association, Vol 66, No 5, p 282-285, May, 1974. 4 fig, 5 ref.

Descriptors: *Water resources development, *Environmental control, *Project planning, Construction, Design criteria, Costs, *California.
Identifiers: *Environmental assessment.

The East Bay Municipal Utility District (EBMUD) in California has adopted a policy and detailed procedures to provide environmental assessment of its programs and projects. The environmental assessment process provides a further tool for the planning design team considering water system improvements. It improves and widens the planning perspective, results in design that is in harmony with the surroundings, and requires construction practices most compatible with the environment. However, more time is required from project commitment or budget approval for project construction, and to add to the total project costs. It is estimated that EBMUD spends over $2000 per month in direct costs for environmental assessment. (Sandoski-FIRL)
W74-13265

THE IMPORTANCE OF DRINKING-WATER PROGRAMS TO THE TOTAL ENVIRONMENTAL GOAL,
South Carolina State Government, Columbia.
E. E. Morris, Jr.
Journal of the American Water Works Association, Vol 66, No 5, p 270-271, May, 1974.

Descriptors: *Water quality control, *Water quality standards, Project planning, *Potable water, Long-term planning

The United States water quality has declined and environmental concern has increased during the past few years. Overall programs are the best answer to these problems, especially in light of the complexity of chemical and bacterial contaminants. Problems and programs illustrating requirements and control measures are cited. (Sandoski-FIRL)
W74-13266

THE WATER INDUSTRY IN THE DECADE OF ENVIRONMENTAL CONCERN,
Gilbert (J.B.) and Associates, Sacramento, Calif.
J. B. Gilbert.
Journal of the American Water Works Association, Vol 66, No 5, p 272-274, May, 1974.

Descriptors: *Industries, *Administration, *Management, Water supply, *Environmental effects, *Water pollution control, Waste water treatment, Water resources, Project planning.

Many of the larger states have moved to change their organizations and establish new water management agencies, but few if any have combined in one organized program all the decisions that affect their water supply. Because the crisis in the water part of the environment has centered around such incidents as the Santa Barbara oil spill, the eutrophication of Lake Erie, and the califaction of fresh water streams, the focus of public attention has been on state and national pollution control programs. As a result, national appropriations, enforcement authorities, planning programs, and related activities are becoming the focal point of the United States' effort to manage its water resources. It is suggested that the water industry should respond to the changes in public awareness and demands by participating in new organizations, planning programs, and joint efforts with waste water agencies. (Sandoski-FIRL)
W74-13268

NEW LEGAL APPROACHES TO ENVIRONMENTAL CONTROL,
New York State Dept. of Environmental Conservation, Albany.
F. X. Wallace.
Hudson River Colloquium, Annals of the New York Academy of Sciences, Vol 250, p 182-185, May 24, 1974.

Descriptors: *Regulation, *Legal aspects, *New York, Legislation, Pollution abatement, Law enforcement, Penalties(Legal), *Water pollution control, Environmental control.

Presently there are about 200 air, water, and solid waste cases being conducted in New York state with many more being prepared for legal action in the field. Since orders that are based merely upon agreements on necessary steps have not proved entirely effective, a new approach calls for financial guarantees that will ensure timely compliance. Under this method , industries and municipalities that have been found to be polluting are afforded the option of consenting to a commissioner's order and posting a financial guarantee of their compliance such as a surety bond or other security. If the polluter complies with the terms of the order the amount is refunded. If the violation continues and the polluter does not comply with the terms of the order, the bond or security is automatically forfeited and additional steps are taken. This new approach increases the polluter's sensitivity to the need for compliance. It also shifts the burden of monitoring pollution abatement to the polluter, by requiring that periodic reports be submitted, documenting the steps taken to comply with the commissioner's order to abate pollution. Other areas which give leverage to the enforcement division are the refusal to allow operation and maintenance grants and the issuance of permits for sewer line extensions. (Sandoski-FIRL)
W74-13271

ENVIRONMENTAL-IMPACT ASSESSMENT FOR PLANT DESIGN AND OPERATION,
Jones and Stokes Associates, Inc., Sacramento, Calif.
R. L. Jones.
Journal of the American Water Works Association, Vol 66, No 5, p 286-290, May, 1974. 2 tab, 10 ref.

Descriptors: *Design criteria, *Specifications, Environmental control, Environmental effects, Planning, Treatment facilities.
Identifiers: *Environmental impact statement(EIS).

Environmental assessments have had a considerable amount of leverage in minimizing environmental deteriments and realizing benefits. Most government agencies and many private concerns are trying to deal effectively with environmental problems and identify the project features. Environmental impact statements (EIS) should be well-conceived and cover all impacts, whether positive or negative, that a planned project will have upon its area. A description of EIS preparation is given. (Sandoski-FIRL)
W74-13273

CLOUDS IN THE CRYSTAL BALL,
California Inst. of Tech., Pasadena. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6D.
W74-13277

LITIGATION UNDER PL 92-500: A STATUS REPORT,
W. L. Rawls.
Journal Water Pollution Control Federation, Vol 46, No 7, p 1646-1648, July, 1974.

Descriptors: *Legal aspects, *Federal Water Pollution Control Act, Administration, Environmental control, Municipalities, Industries, State governments.

A corresponding surge in litigation has been witnessed in the second year following the 1972 amendments to the Federal Water Pollugion Control Act. Grievances of the plaintiffs, including states, municipalities, environmentalists, and industries, have all centered on the issue of administrative flexibility and discretion under the law. States have confined their litigation to funding and permits for federal facilities. Setbacks and victories of the environmentalists with regards to the 1972 amendment are mentioned stressing the importance of the legality of EPA's variance clause for its Section 304 guidelines and its permit regulation exempting certain classes of agricultural point sources and silvacultureal and storm sewer point sources. There have been isolated challenges to individual industrial permits but the consent decrees negotiated have added nothing in the way of importance to case law. Although no legal briefs have been filed concerning effluent guidelines, preliminary motions broadly outline the position industry will assume. (Sandoski-FIRL)
W74-13289

MCA ENDORSES WASTE DISPOSAL PROVISIONS.
For primary bibliographic entry see Field 5E.
W74-13291

RESEARCH AND DEVELOPMENT,
Water Pollution Research Lab., Stevenage (England).
A. L. Downing, and D. H. A. Price.
Water Pollution Control, Vol 73, No 3, p 277-288, 1974. 3 ref.

Descriptors: *Research and development, *Europe, Project planning, *Water pollution control, International commissions.
Identifiers: European Economic Community.

The types of research and development activity in the environmental field that are likely to develop under the European Economic Community auspices are indicated. A background of information about the role of relevant community institutions, their policy in regard to environmental problems, and their interactions with other international bodies sponsoring research in this sphere are presented. (Sandoski-FIRL)
W74-13292

THE EUROPEAN SCENE,
Emschergenossenschaft and Lippeverband, Essen (West Germany). Dept. of Chemistry.
For primary bibliographic entry see Field 5D.
W74-13293

THE INSTITUTE AND EUROPE,
J. R. Simpson.
Water Pollution Control, Vol 73, No 3, p 295-306, 1974.

Descriptors: *Europe, *Water pollution control, International commissions, Project planning.
Identifiers: European Economic Community, *United Kingdom.

Objectives of the Institute of the Water Pollution Control of the United Kingdom are presented in relation to its influence on national and international attitudes and policies. The Institute's position in the European Economic Community also is discussed. (Sandoski-FIRL)
W74-13294

PROGRAM WILL CONTROL POLLUTION FROM WATERCRAFT,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W74-13295

WATER ACT 1973 RIVERS (PREVENTION OF POLLUTION) ACT 1951 ATTORNEY GENERAL V. WELLINGBOROUGH UDC.
Water Services, Vol 78, No 939, p 167, May, 1974.

Descriptors: *Legislation, *Regulations, *Local governments, *Judicial decisions, Jurisdiction, Treatment facilities, Sewage disposal.
Identifiers: *United Kingdom(Wellingborough-Eng).

The Court of Appeal recently has heard the first appeal arising out of the transfer of sewage disposal functions under the Water Act 1973. It was an appeal against an injunction granted against the former Wellingborough U.D.C. So as not to lose control of its new facilities, the local authority stepped up on-line construction and service of the facility, a measure which breached section 7 of the Rivers Act 1951 since the effluent would not comply with the consent which had previously been given. Thus the Attorney General requested an injunction against using the new sewage disposal works until such time as it had been completed effectively. The Court of Appeal dismissed the appeal by the Wellingborough U.D.C. against this injunction and also decided that it was not excusable for the local council to pour effluent from its uncompleted works into the river. (Sandoski-FIRL)
W74-13296

THE BIODEGRADATION OF HYDROCARBONS,
For primary bibliographic entry see Field 5B.
W74-13300

SOME INVESTIGATIONS CONCERNING UPVC WATER AND SEWER PIPES AND FITTINGS,
Vattenbyggnadsbyran Ltd., Stockholm (Sweden).
For primary bibliographic entry see Field 8A.
W74-13313

MEETING THE NPDES DEADLINE: DOES CLOSE ONLY COUNT IN HORSESHOES.
J. T. Sliter.
Journal Water Pollution Control Federation, Vol 46, No 7, p 1649-1650, July, 1974.

Descriptors: *Legislation, *Discharge(Water), *Permits, Legal aspects, Federal government.
Identifiers: *Envirornmental Protection Agennt.

With nearly 45,000 applications now on file, it will be impossible for the Environmental Protection Agency and/or the 15 states administering their own programs to issue the National Pollution Discharge Elimination System (NPDES) permits to all discharges by the required congressionally-imposed deadline date of December 31, 1974. EPA announced that the agency hopes to issue permits to all major dischargers and to a substantial number of minor ones by the end of the calender year. Epa has called for legislative relief from this and other impending deadlines with a change in the permit deadline to July 1, 1974. It is thought that the focus of attention regarding permits may shift from attempts to obtain them to the issue of enforcing them by January 1975. Methods of enforcement for noncompliance include jail sentences for company officials as well as enforcement orders and civil actions in district courts. (Sandoski-FIRL0
W74-13314

WATER QUALITY CONSIDERATIONS IN PLANNING SMALL WATERSHEDS,
Soil Conservation Service, Jackson, Miss.
J. P. Burt, and R. E. Gentry.
Journal of Soil and Water Conservation, Vol 39, No 3, p 133-135, May/June, 1974. 3 tab, 2 ref.

Descriptors: *Water quality control, *Water quality standards, *Water supply, *Field studies, Conservation, Temperature, Dissolved oxygen, Dissolved solids, Odors, Chemicals, Public health, Streams, Lakes, Drainage areas, *Mississippi, *Small watersheds.

State water quality criteria in Mississippi are summarized for water supply and water-contact sports. Factors listed are dissolved oxygen, pH, temperature, bacteria, chlorides, specific onductance, dissolved solids, threshold odor, phenolic compounds, and certain chemicals. Criteria are listed in order to protect a participant's health in water sports and to provide a safe and appealing body of water. Field reconnaissance of a darinage area and water analyses of its streams were used to estimate the quality of water in the planned lakes. (Prague-FIRL)
W74-13319

EFFLUENT CHARGES-A PRICE ON POLLUTION,
Pennsylvania State Univ., University Park. Center for Air Environment Studies.
T. A. Ferrar, and R. L. Horst.
Atmospheric Environment, Vol 6, No 6, p 657-667, June 1974. 6 ref.

Descriptors: *Effluents, Pollution, Economics, *Pollution taxes(Charges).
Identifiers: *Effluent charge, National tax policy.

The concept of putting a price on pollution has been proposed as a means of inducing control of environmental deterioration. The non-economist reader is presented with theoretical advantages offered by an effluent charge strategy by reviewing some of the arguments presented by economists for the adoption of a national tax policy. Effluent chge is briefly discussed. Analysis focuses on the question of efficient allocation of resources in an idealized, perfectly competitive economy with subsequent generalization to imperfect markets. Examined also is the least-cost to society attribute of an effluent charge scheme. (Leibowitz-FIRL)
W74-13320

WATER QUALITY PROBLEMS ARISING FROM IRRIGATION RETURN FLOW,
Bengal Engineering Coll., Howrah (India). Dept. of Civil Engineering.
D. K. Ghosh.
Journal of the Institution of Engineers (India), Vol 54, Part PH2, p 55-56, February, 1974. 5 ref.

Descriptors: *Water quality control, *Management, *Irrigation, Agriculture, Management, Research, *Return flow.

Major water quality problems arise from irrigation return flows. Their solutions, the control measures required, and necessary research activities have been indicated. Quality of the residual water draining from irrigated areas as return flow may be materially degraded in several ways, as compared with the initial water supplied. Irrigated agriculture consumes the largest quantity of water, and it will be of great significance in the overall water management and development in a basin. This is particularly so when water resources are fully utilized. Measures for controlling water quality degradation by irrigation return flows are urgently required. (Prague-FIRL)
W74-13322

COMPUTERIZED REPORTS IMPROVE SEWER MAINTENANCE,
W. S. Van Natta.
The American City, Vol 89, No 6, p 81-83, June, 1974. 2 fig.

Descriptors: *Sewerage, *Costs, *Municipal wastes, Statistics, Sewer systems, Maintenance.
Identifiers: Records.

Accurate and accessible records are essential in the efficient operation of sewers, and in the inexpensive operation of the same. Information is needed on each separate length of sewer in the city's system, and the development of the sorts of records most helpful to those needing the information. A statistical record evaluating the efficiency and progress of overall maintenance is required for administrators and engineers, and a detailed record which would reflect each individual maintenance action and the expense to that individual portion sewer system is necessary. (Leibowitz-FIRL)
W74-13339

POLLUTION CONTROL: THE RELATION OF WATER QUALITY PROTECTION TO EXPLORATION FOR AND PRODUCTION OF OIL AND GAS IN THE SOUTHWEST,
Texas Water Commission, Austin.
J. J. Vandertulip.
In: Oil and Water - A Symposium, Bureau of Economic Geology, Texas University, Austin, January 29, 1965. p 33-39 (1965).

Descriptors: *Groundwater, Water pollution, *Oil industry, Saline water, Statutes, Laws, *Brines, Wells, Natural gas, Water quality, Water quality control, Legal aspects, Economics, *Southwest US.
Identifiers: Texas Water Pollution Control Board, *Texas Water Commission, Salt water disposal, Brine pollution control, Subsurface disposal.

Brine pollution of water is not a new nor simple problem. The following points appear important in an objective appraisal of the situation: (1) Oil and gas production continues to increase, and salt water production goes up as an unavoidable corollary. Salt water production in Texas was reported at approximately 21/4 billion barrels in 1961. (2) Brine pollution of ground and surface water can and has resulted from improper or imprudent practices of exploration, well completion, salt water disposal, and well abandonment. (3) Brine pollution control must be based upon effective enforcement authority, sound petroleum engineering techniques, and competent evaluations of ground and surface water hydrology. (4) Texas uses approximately 15 million acre-feet of water each year for consumptive purposes, of which 70 percent is supplied by ground-water aquifers. Oil and gas fields coexist throughout the state with the areas underlain by the major aquifers. Ineffective water protection programs in these areas is a particular threat to water quality and conservation. (5) While simplification of governmental pollution control is desirable, it is apparent that brine pollution is a problem involving the immediate responsibilities of the oil and gas administrative agencies and the water planning agencies of individual states. (Campbell-NWWA)
W74-13342

ENVIRONMENTAL PROTECTION-ATTEMPT AT A CRITICAL OBSERVATION, (IN GERMAN),
Graz Univ. (Austria). Hygiene-Institut.
J. R. Moese.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med, Vol 157, No 2/3, p 95-101, 1973.
Identifiers: *Noise, Powersaw, *Detergents, Snowmobile, Aircraft, *Water pollution control, *Air pollution.

Specific pollution problems, such as the use of gasoline instead of electrically operated lawn mowers and power saws, snowmobiles, noisy construction equipment and aircraft are some of the common aspects of everyday life which should be controlled. Clear water should be conserved, detergents used sparingly and the washing of automobiles and oil changing near bodies of freshwater should be prohibited. Air pollution caused by heating units and gasoline motors and waste pollution as well as optimum utilization of space are also discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-13357

SANITARY EVALUATION OF WATER QUALITY IN THE INITIAL OPERATING PHASE OF THE VYACHESLAV RESERVOIR, (IN RUSSIAN),
Meditsinskii Institut, Tselinograd (USSR).
For primary bibliographic entry see Field 5B.
W74-13364

CONTRIBUTION TO THE MOSQUITO FAUNA (DIPTERA, CULICIDAE) OF THE LANDSCAPES BETWEEN THE HIGH PLAINS OF THE LOWER HARZ MOUNTAIN, THE LOWER VALLEY OF THE UNSTRUT AND THE MID ELBE RIVER SECTION: 4. RESULTS OF PHYSICAL-CHEMICAL ANALYSIS OF LARVAL BREEDING WATERS OF THE GENUS AEDES MEIGEN 1818,
V. Dix.
Hercynia Fachgeb Bot Geogr Geol Palaeontol Zool, Vol 9, No 1, p 69-74, 1972, Illus.
Identifiers: Aedes, Culicidae, Diptera, Fauna, Larvae, *Mosquitoes, Germany(Halle).

Physico-chemical analysis of larval breeding waters at the genus Aedes in the district of Halle (East Germany) are reported. The factors examined included pH, Cl content KMnO4 consumption, electrolytic conductivity, alkalinity and hardness. The latter 2 are insignificant as ecologically limiting factors, and pH and saline content have the greatest significance.--Copyright 1973, Biological Abstracts, Inc.
W74-13386

WATER POLLUTION ASPECTS OF STREET CONTAMINANTS,
Illinois State Univ., Normal. Coll. of Applied Science and Technology.
For primary bibliographic entry see Field 5B.
W74-13411

INDUSTRIAL WASTE EFFLUENT MONITORING,
For primary bibliographic entry see Field 5A.
W74-13422

WATER QUANTITY AND QUALITY MANAGEMENT IN THE RUHR VALLEY,
Ruhrverband und Ruhrtalsperrenverein, Essen (West Germany).
K. R. Imhoff.

Descriptors: *Water management(Applied), *Water quality, *Water supply, *Water pollution control, *Europe, *Organizations, *Administrative agencies, Foreign countries, Waste water treatment, Oil pollution, Water reuse, Costs, Research and development, Industrial water, Industrial wastes, Human population.
Identifiers: *Germany(Ruhr Valley).

Because of the concentration of coal, industry, and population in the Ruhr Valley of Germany, special measures had to be taken to guarantee water supply and waste water disposal. Water quantity and quality are managed by strong water associations responsible for drainage areas. The roles of these associations in waste water treatment, prevention of oil pollution, water reuse, costs, and research are discussed, as well as the part which each of these areas plays in the overall control of water quantity and quality. (Witt-IPC)
W74-13424

RATIONAL ORGANIZATION OF WATER CONSUMPTION IN THE WOOD PREPARATION ROOM OF PULP AND PAPER MILLS (ORGANIZATSIYA RATSIONAL'NOGO VODOPOL'ZOVANIYA V DREVESNOPODGOTOVITEL'NYKH TSEKHAKH TSELLYULOZNO-BUMAZHNYKH PREDPRIYATII),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Tsellyulozno-Bumazhnoi Promyshlennosti, Leningrad (USSR).
For primary bibliographic entry see Field 3E.
W74-13426

HOW TO CURTAIL OR END DISCHARGES OF SEWAGE FROM SHIPS.
Marine Engineering/Log, No 5, p 34-37, 119. May 1974.

Descriptors: *Sea water, *Boating, *Regulations, *Water pollution control, Sewage treatment, Treatment facilities, Equipment, Capital costs, Boats, United States, Discharge, Maintenance costs.
Identifiers: *Marine Sanitation Devices(MSD's).

Prevention of discharging untreated sewage from vessels in marine waters is becoming increasing apparent not only in the United States, but on an international level. Due to existing and proposed regulations, ship operators must install marine sanitation devices (MSD's) costing about $25,000 to $80,000, in addition to installation and maintenance costs. Various types of MSD's and discharge systems as well as selection factors are discussed in relation to United States regulations. (Sandoski-FIRL)
W74-13436

DOUBLE-BOTTOM BARGES PROVIDE GREATER PROTECTION AGAINST WATER POLLUTION.
Marine Engineering/Log, No 5, p 42-43, May 1974.

Descriptors: *Barges, *Transportation, *Water pollution control, Construction materials, Oil spills, Costs, Inland waterways.
Identifiers: Petroleum products.

The Dravo Corporation has designed and built double-skin integrated tank barges used for the

ransportation of petroleum products. From a fuel utilization standpoint, transportation by towboats nd barges is considerably more efficient and economical as compared with river tank shipping, ail service, and truck transport. In double-skin arges, all framing is on the exterior so that tank compartments have smooth, easy-to-clean interior urfaces assuring purity of cargo. Also, double-kin construction provides for greater protection gainst spillage should the exterior shell of the arge hull be damaged. The upward trend toward he use of double-skin barges for transporting etroleum products is part of the current growth in verall shipping volume on the 25,000 miles of the Jnited States' inland waterways system. (Sandoski-FIRL)
W74-13437

SLOW-RELEASE PESTICIDE SYSTEM: POLYMERS OF LACTIC AND GLYCOLIC ACIDS AS ECOLOGICALLY BENEFICIAL, COST-EFFECTIVE ENCAPSULATING MATERIALS,
Battelle Columbus Labs., Ohio.
R. G. Sinclair.
Environ Sci Technol. Vol 7, No 10, p 955-956. 1973 Illus.

Descriptors: *Pesticides, *Herbicides, Agricultural runoff, Pollutants, Water pollution sources, Chemical wastes, Polymers, Plastics, *Water pollution control.
Identifiers: Glycolic-acid, Lactic-acid, Thermoplastics, Copolymers, Slow-release agents.

Thermoplastic polymers and copolymers of glycolic and lactic acid are employed as the slow-release encapsulating agent. These polymers degrade to natural materials that are harmless to the environment and, in doing so, slowly release encapsulated herbicides or pesticides. The total polymer and pesticide package is easy to fabricate and offers the potential of effectively controlling the runoff or agricultural chemicals into streams while maintaining an effective dose.--Copyright 1974, Biological Abstracts, Inc.
W74-13445

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

ENVIRONMENTAL PLANNING METHODS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
D. A. Bella.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR 018-74, January 1974. p 53-60. 10 ref.

Descriptors: *Environmental control, *Coasts, *Regional development, *Planning, Estuaries, Regional analysis, Methodology, Oregon, Management, Conservation, Decision making.
Identifiers: Diversity planning.

The diversity approach, developed in a recent study entitled 'General Planning Methodologies for Oregon's Estuarine Natural Resources,' one of several comprehensive planning methods to organize human activities within estuaries, is critiqued. This approach assumes an uneven distribution of man's environmental influences with development efforts clustered in a number of selected estuarine systems while steps are undertaken to discourage development in others. The basic management unit under the diversity approach is several estuaries. Advantages of this method include reduced large scale environmental changes, preserved environmental options, and a higher quality of life. Estuarine systems in the approach are classified according to the conservation or development envisioned for each and distinguished by the kinds and degree of irreversibility of commercial, industrial, residential, and recreational activity permitted. The placing any system into one of the three classes does not imply the abandonment of sound environmental practices--the best methods should be utilized to minimize adverse impacts. A number of mechanisms including zoning, land use, legislation, and conditions attached to federal funding, may be utilized to encourage the clustering and other patterns suggested by the diversity approach. (See also W74-12756) (Schroeder-Wisconsin)
W74-12762

WATER RESOURCES DISTRIBUTION OPTIMIZING,
For primary bibliographic entry see Field 6D.
W74-12783

A SELECTED ANNOTATED BIBLIOGRAPHY ON LAND RESOURCE INVENTORY AND ANALYSIS FOR PLANNING,
Pennsylvania Univ., Philadelphia. Center for Ecological Research in Planning and Design.
E. B. MacDougall, and C. E. Brandes.
Pennsylvania Dept. of Environmental Resources, Harrisburg, February 1974. 41 p.

Descriptors: *Land use, *Natural resources, *Planning, *Methodology, Bibliographies, Land management, Decision making, Land resources, Soils, Climatology, Hydrology, Limnology, Evaluation, Computer programs, Vegetation, Wildlife, Aesthetics, Geology, Census.

An annotated bibliography covering environmental planning material concerned with land resource inventories and planning analyses tools is presented. The material consists of selected articles, reports and books published in the U.S. and Canada during the 1960-1973 period. Articles are categorized under natural sciences and planning composed of work by scientists relevant to planning decisions; methods of land resource inventory and analysis for planning; prototypical environmental planning studies; examples of land resource inventories for planning; an evaluation of scenic quality; an information systems section; an environmental plan incorporating land resources analysis components; a series of review criticisms and commentaries of published environmental planners; and a bibliography concerned with natural resources science literature relevant to planning. Over 259 annotated bibliographies are provided. (Schroeder-Wisconsin)
W74-12795

ECONOMIC ASPECTS OF THE SYSTEMS APPROACH TO WATER MANAGEMENT,
A. A. Beschinskiy, and A. Sh. Reznikovskiy.
Soviet Hydrology: Selected Papers, No 1, p 15-25, 1973. 10 ref. Translated from Water Resources (Vodnyye resursy) No 1, p 21-35, 1973.

Descriptors: *Water management(Applied), *Systems analysis, *Water utilization, *Economics, *Operation and maintenance, Comprehensive planning, Control, Simulation analysis, Optimization, Costs, Capital, Investments, Regional development, Hydrology, Projects.
Identifiers: *USSR, Economic effectiveness.

Water management in the USSR has entered a phase of complex and multiple-systems control, covering large areas, having complex internal and external relations--systems which are both dynamic and stochastic. The diversified controlling elements of the systems have essentially different technical and economic characteristics and a complex topology. Existing methods for planning and operating system elements are not always effective. A comprehensive systems analysis is required, water resources must be accounted for when drawing an inter-industry balance, and mathematical models developed in recent years must be used. Needed are the aid of modern computer technology and the maximum mechanization and automation of planning, project designing, and exploitation. The broad range of methodological technical-economic problems facing water management includes: statistical simulation of random processes for planning and operation (i.e., river runoff, evaporation, etc.); optimization of capital investments in water management and selection of the optimum parameters of its individual elements; optimization of the operating conditions of systems and control of their exploitation, including automatic control; and economic estimates, comparisons, and optimization criteria. Solution of these and other problems facing water management requires extensive scientific investigation; means and methods of performing these investigations are examined. (Bell-Cornell)
W74-13017

PLANNING METHODOLOGY FOR THE DESIGN OF REGIONAL WASTE WATER TREATMENT SYSTEMS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W74-13018

LINEAR DECISION RULE: A NOTE ON CONTROL VOLUME BEING CONSTANT,
Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 4A.
W74-13019

INDUSTRIAL ECONOMIC MODEL OF WATER USE AND WASTE TREATMENT FOR AMMONIA,
Houston Univ., Tex.
For primary bibliographic entry see Field 5D.
W74-13020

MULTIOBJECTIVES IN WATER RESOURCE SYSTEMS ANALYSIS: THE SURROGATE WORTH TRADE OFF METHOD,
Case Western Reserve Univ., Cleveland. Ohio. Dept. of Systems Engineering.
Y. Y. Haimes, and W. A. Hall.
Water Resources Research, Vol 10, No 4, p 615-624, August, 1974. 4 fig, 1 tab, 36 ref.

Descriptors: *Water resources, *Multiple-purpose projects, *Decision making, *Optimization, Methodology, Economics, Constraints, Equations, Dams, Reservoir storage, Planning, Mathematical models, Systems analysis.
Identifiers: *Surrogate worth trade off method, Multiple regression analysis, Net benefits.

Water resource projects are generally constructed to serve multiobjectives, due to the nature of the economic factors of large-scale projects such as reservoirs, dams, aqueducts, and the development of groundwater systems. This makes the application of classical optimization methodologies quite difficult. The problem of noncommensurable multiobjective functions in water resource systems is considered. Potential strategies in multiobjective decision theory are summarized, noting that fundamentally decision processes utilize a logical argument to eliminate large numbers of alternatives from further contention for the 'best' decision. A new technique, the surrogate worth trade off method, which allows the quantitative consideration of noncommensurable multiobjective functions is presented. Procedures for the derivation of the trade off functions and the surrogate worth functions are developed and analyzed. Major characteristics and advantages of the method are summarized. In particular, the trade off and surrogate worth functions are constructed in the func-

tional space, where an interaction with the decision maker takes place; only then are these functions transformed into the decision space. The Reid and Vemuri multiobjective problem in water resources, successfully solved via this method, has been chosen as an example. (Bell-Cornell)
W74-13023

THE APPLICATION OF STATISTICAL TECHNIQUES TO RIVER QUALITY MANAGEMENT,
EASAMS, Camberley (England).
For primary bibliographic entry see Field 5A.
W74-13024

OPTIMIZED DESIGN OF A SUBSURFACE DRAINAGE SYSTEM,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W74-13025

DYNAMIC ANALYSIS AND OPTIMAL FEEDBACK CONTROL SYNTHESIS APPLIED TO BIOLOGICAL WASTE TREATMENT,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W74-13026

SOME PROBLEMS ON THE STOCHASTIC FLOOD CONTROL,
International Inst. for Applied Systems Analysis, Laxenburg (Austria).
For primary bibliographic entry see Field 4A.
W74-13029

A STUDY OF HOW WATER QUALITY FACTORS CAN BE INCORPORATED INTO WATER SUPPLY ANALYSIS,
Ernst and Ernst, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-13030

DECISION MAKING UNDER UNCERTAINTY: ECONOMIC EVALUATION OF STREAMFLOW FORECASTS,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 4A.
W74-13044

ECONOMICS AND ECONOMISTS IN WATER RESOURCE DEVELOPMENT,
Wisconsin Univ., Madison. School of Natural Resources.
For primary bibliographic entry see Field 6B.
W74-13061

DESERT ECOSYSTEMS: ENVIRONMENT AND PRODUCERS,
Hebrew Univ., Jersualem (Israel). Dept. of Botany.
For primary bibliographic entry see Field 2A.
W74-13150

THE CONFLICT BETWEEN CONSUMPTION AND POLLUTION,
Stanford Univ., Calif.
For primary bibliographic entry see Field 5G.
W74-13236

6B. Evaluation Process

A SOCIO-ECONOMIC EVALUATION OF USERS OF A WATER-BASED URBAN TOURIST ATTRACTION: SAN ANTONIO, TEXAS,
Texas A and M Univ., College Station. Dept. of Agricultural Economics.
R. D. Lacewell, W. L. Trock, and R. Whorton.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 304, $3.25 in paper copy, $2.25 in microfiche. Texas Agricultural Experiment Station Paper 10929, February 1974. 15 p, 7 ref. OWRT B-102-TEX(2).

Descriptors: *Tourism, *Water resources development, *Cities, Economic justification, Planning, Regional economics, Texas, Evaluation.
Identifiers: *San Antonio(Texas), San Antonio River(Texas), Paseo del Rio(Texas).

Since 1960 the Paseo del Rio, a highly developed portion of the San Antonio River which meanders through downtown San Antonio has become a major tourist attraction. Business establishments in the area have grown to over 30 and promotional activities for the area are growing. A personal interview survey was conducted during 1971-72 to aid local decision makers in evaluating several suggested extensions of the Paseo del Rio. Users were randomly sampled during each season with sampling per season conducted for one week. Socioeconomic characteristics including age, race, education, occupation, level of expenditures, distance traveled, and preferences were collected in 3,347 interviews. To estimate the relationship among selective user characteristics and level of expenditures, regression analysis was used. Results inducated 28%, 33%, 18% and 14% of the users utilized the river taxi--a water tour--in the spring, summer, fall and winter, respectively. Individuals most frequently interviewed were male, about 30, a professional, businessman, student, or serviceman, and a San Antonio resident with an average income of $9,000. Expenditures of the typical user group were $5.50, primarily on food and sightseeing. Nearly 1 million people visited the area duing the study period, expending $2 million. (Schroeder-Wisconsin)
W74-12755

A LOOK AT THE COASTAL ZONE,
Oregon State Univ., Corvallis. Sea Grant College Program.
W. Q. Wick.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR 018-74, January 1974, p 1-4.

Descriptors: *Coasts, *Management, Oregon, Environment, Comprehensive planning, Coordination.
Identifiers: Coastal zone.

The coastal zone represents an interface between the earth's three domains--land, sea and atmosphere. While coastal zones are diverse they share a number of common processes: mixing of fresh and salt water, transport of land sediment, and buffeting by the wind and tides. Abundant resources, mild climate, natural beauty, and the opportunity to make a living have placed increased demands on the zone's resources. The continental shelves and nearby water, for example, represent only 5% of the earth's surface area and yet nearly two-thirds of the human population lives near the coasts. World-wide, coastal zones are being destroyed by a number of human-related factors including chemical wastes, dumping, increased sedimentation and coastal water structures. Such factors can destroy the coastal zone unless comprehensive planning is achieved. For Oregon, an increased number of tools to aid coastal citizens in the planning process are being developed. Planning, however, requires compromises but 'proper compromises' can establish harmony. (See also W74-12756) (Schroeder-Wisconsin)
W74-12757

OPERATIONS OF THE COASTAL COMMISSION,
Oregon Coastal Conservation and Development Commission, Florence.
W. E. Ternyik.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR 018-74, January 1974, p 5-19.

Descriptors: *Coasts, *Comprehensive planning, *Management, Regional development, Resource development, Decision making, Coordination, Planning, Estuaries, Natural resources, Economics, Conservation, Environment, Standards, Legislation, Social participation, Mapping, Transportation, Data storage and retrieval, Institutions, Oregon.
Identifiers: *Coastal zone, *Problem areas.

The Oregon Coastal Conservation and Development Commission (OCCDC) was created in 1971 to prepare and recommend plans and implementation approaches for the wise management of the natural resources in the coastal zone; and to submit a final report for legislative action by 1975. An interim report of OCCDC activities is given. OCCDC has outlined a series of resource problems and critical resource concerns and identified 18 natural categories including estuaries, wetlands, beaches, unique scenic features, the continental shelf, wildlife and fish habitats, alternative land use areas, and aesthetics, which are of critical environmental concern. Problems identified for the coastal zone include the lack of comprehensive inventory of its unique and fragile features, unbridled and poorly conceived development, increased population pressure, visual pollution, uncontrolled harvesting of coastal resources, limited financial resources to support required public services, and lack of transportation planning. Approaches to examine each of the problems include surveys and analysis of the coastal economic sectors, coordinated transportation planning, mapping programs, data storage and retrieval programs, and guidelines for development programs to aid local units in planning estuarine areas are presently underway or are being developed. (See also W74-12756) (Schroeder-Wisconsin)
W74-12758

PROPERTY OWNER ATTITUDES AND PERCEPTIONS,
Oregon State Highway Div., Salem. Environmental Section.
J. A. Zinn.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR 018-74, January 1974, p 29-37. 4 tab, 1 ref.

Descriptors: *Estuaries, *Regional development, *Social values, *Attitudes, Oregon, Regional analysis.
Identifiers: *Siletz Bay(Ore).

Local perceptions of use patterns and development potential were surveyed for Siletz Bay, a small estuary along the central Oregon coast. Three communities surround the bay: a vacation development--Salishan; Taft--a service center for the region, and Kernville and Cutler City--two small economically depressed villages. Information was acquired through questionnaires, soliciting 146 or 23% of the households in the area. Collected data was analyzed using six socioeconomic variables: age, length of property ownership, temporary or permanent residency, commercial or private property ownership, community of re-

sidence, and family income, to ascertain trends in response patterns. Generally residents living in the bay the longest used it the least. Commercial respondents were the most active users of the bay and perceived its greatest use. Much of the conflict generated around the bay centers on conservation or preservation of the estuary versus development to foster economic return. Only 31% of respondents felt there should be no major modification--61% of temporary and 22% of the permanent residents. Typically, wealthier, average age, temporary residents favored conservation. Younger or older permanent residents of the third community tended to favor development. (See also W74-12756) (Schroeder-Wisconsin)
W74-12760

THE COAST AS SEEN BY THE CORPS OF ENGINEERS,
Corps of Engineers, Portland, Oreg. North Pacific Univ.
A. R. Marshall.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR-018-74, January 1974, p 61-67.

Descriptors: *Coasts, *Coastal engineering, *Federal government, Regional development, Management, Water resources development, Oregon.
Identifiers: *Corps of Engineers.

A brief historical overview and the growing scope of the Corps of Engineers in coastal zone management problems is presented. The Army Corps of Engineers dates from the Battle of Bunker Hill when Richard Gridley was appointed chief engineer to plan and dig a trench system against the expected British attack. Included in their past activities are levee work, nationwide flood control systems, and assistance in development and maintenance of harbors, canals, and navigable rivers. The general problem of the coastal zone as perceived by the Corps is one of supply and demand--how to reconcile the current and projected needs of the people with the limited supply of shoreline resources in a socially, environmentally, and economically acceptable way. Programs utilized to achieve this objective are navigation projects, permits, coastal protection projects, the national shore and erosion study, the Coastal Engineering Research Center, beach erosion projects, and flood plain information studies. Along the Oregon coast, currently the Corps is building jetties, conducted dredging and studying requests for other jetty construction. All their work is documented by Environmental Impact Statements. Public involvement is emphasized in the planning stages and all work is coordinated with all other interested agencies and citizens. (See also W74-12756) (Schroeder-Wisconsin)
W74-12763

SOUTH CAROLINA'S NEW MARINE RESOURCES CENTER,
South Carolina Wildlife Resources Dept., Charleston. Marine Research Lab.
For primary bibliographic entry see Field 2L.
W74-12775

GROWTH AND QUALITY--TECHNOLOGY'S DILEMMA. 2. ECOLOGY AND GROWTH--THE TRAGIC INSIGHT,
California Univ., Santa Barbara.
G. Hardin.
Research Management, Vol 16, No 6, p 9-12, 1973.

Descriptors: *Ecology, *Costs, *Decision making, *Ethics, Natural resources, Planning, Welfare(Economics), Social impact, Social values, Environment.

Essential to the understanding of the current ecological crisis is a keen awareness of the concept of tragedy. Not tragedy in the sense commonly used but in the ancient and technical sense. Whitehead's explanation of the technical meaning of tragedy suggests the remorseless working of things; the inevitableness of destiny. Destiny, of course, has not been a palatable concept among Americans. Partially this has been the result of progress--the concept that there is no limit to man's accomplishment, and the ability to avoid assessment of the total cost through the use of externalities. Often economists become entagled in this illusion building their theories on the theory of 'cowboy economics' as Boulding described it, based on the philosophy of 'use it, throw it away, and move to a new frontier; don't pay the costs there's always more out there.' Such an approach has been slow to change, but gradual inroads into the tragic insight have accured Forrester's 'Limits to Growth' and growing economic models assessing the tradeoffs between environmental and economic impacts illustrate the changing philosophy. But such recognition does not come quickly nor is it certain to continue unless the sense of inevitability is better understood. (Schroeder-Wisconsin)
W74-12778

ECONOMIC APPRAISAL OF MICHIGAN'S SPORT FISHERY, JANUARY 1 - APRIL 24,
Michigan Dept. of Natural Resources, Lansing.
P. V. Ellefson, and G. C. Jamsen.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11018, $4.00 in paper copy, $2.25 in microfiche. Research and Development Report No 227, March 1971. 37 p, 18 fig, 15 tab.

Descriptors: *Evaluation, *Economic impact, *Michigan, *Sport fishing, Fish management, Salmon, Trout, Recreation demand, Lake Michigan, Value engineering, Benefits, Psychological aspects.

In order to develop a management plan for Michigan's sport fisheries an analysis was undertaken of the recreational demand characteristics of the salmon and steelhead trout fishermen (SS) and the other fishermen (OF). The determination of the recreationalists' valuation of the fishery depends on demand analysis, based on a demand curve for the total recreational experience--anticipation, planning, traveling from and to the site, activity at the site, and recollections. Next, a separate demand curve for only the fishing experience is determined. Finally, the total value of the resource to the fisherman is developed by summing the area under the demand curve--total willingness to pay. The valuation process was applied to statewide SS activities and then to SS activities in Lake Michigan and its tributaries. Results indicate that for the four months surveyed $587,600 and $237,400, respectively, of recreational value accrued; for OF, statewide, this value was $51 million. The importance of a number of variables to SS and OF angler days was also determined through multiple regression of fish available, accomodations, and fishing cost, and were found significant for SS while only the relationship between angler days and catch for OF. Characteristics of fishermen are also summarized. (Schroeder-Wisconsin)
W74-12779

ECONOMIC GROWTH AND THE GENERATION OF WATERBORNE WASTES,
Rhode Island Univ., Kingston. Dept. of Resource Economics.
For primary bibliographic entry see Field 5B.
W74-12782

MORMON LAKE,
Arizona Academy of Science, Tempe.
E. L. Smith, and G. L. Bender.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-225 246 $3.25 in paper copy, $2.25 in microfiche. Report No OEPAD-EP-73-31, 1 June 1973. 17 p, 5 append. HUD CPA-AZ-09-16-1008.

Descriptors: *Lakes, *Conservation, Wildlife conservation, Arizona, Preservation, Recreation, Education, Wildlife habitats, Systematics.
Identifiers: *Mormon Lake(Ariz).

Justifications for the proposal that Mormon Lake, Arizona be established as a senic and recreational natural area are presented. The lake, bordered on the west by Mormon Mountain and on the east by Anderson Mesa, represents the state's largest natural lake when full. The lake's water level depends entirely on precipitation in the surrounding watershed with the result that it has dried up completely in the summers of 1947, 1956 and 1972. The surrounding area is a typical transition life-zone habitat. Ponderosa pine is generally the dominant species except on the lake's east side where a more unique deciduous flora exists. Establishment of the site as a natural area would provide pretection for the unusual flora assemblages and where community succession, plant-soil, plant-climate and plant-plant relationships can be studied. The fauna is not highly unique except for a certain shrew species rarely found else where in the state. The area has had a long history of disturbances. At present Mormon Lake is a popular recreation area, providing water sports and camping opportunities. Designation of Mormon Lake as a natural area should conserve and enhance its recreational, scenic, and educational value in the future. (Schroeder-Wisconsin)
W74-12784

BENEFIT COST ANALYSIS OF ALTERNATIVE EXPANSION SITES FOR THE VIRGINIA KEY SEWAGE TREATMENT PLANT,
Miami Univ., Fla. Sea Grant Program.
For primary bibliographic entry see Field 5D.
W74-12785

INTERTEMPORAL ALLOCATION OF GROUNDWATER IN THE CENTRAL OGALLALA FORMATION: AN APPLICATION OF A MULTISTATE SEQUENTIAL DECISION MODEL,
Haile Selassie I Univ., Alem Maya (Ethiopia).
S. E. Bekure, and V. R. Eidman.
Southern Journal of Agricultural Economics, Vol 3, No 1, p 155-160, 1971. 1 tab, 9 ref.

Descriptors: *Net income, *Groundwater resources, *Decision making, Linear programming, Groundwater recharge, Dynamic programming, Optimum development plans, Great Plains, Water supply, Water utilization, Irrigated land, Projections.
Identifiers: Central Ogallala Formation, Multistage decision model.

The Central Ogallala Formation located between the Arkansas River and the Southern Canadian River provides large volumes of groundwater for irrigation, industries and municipal use. Given the growing water demand and relative low recharge rate overdrafts of the aquifer have been increasing (0.11 million acre feet in 1954 to 2.7 million in 1964). To determine the optimum intertemporal allocation of this groundwater resource a multistage sequential decision model was developed. The model consists of a series of stages joined such that the output of one stage becomes the input of the other. A typical stage contains five components: an input stage, an output state, a decision variable, a stage return and a stage transformation. The model assumes a 100 year planning horizon and interest rates of 0, 4, and 8%. Input data required includes quantity of groundwater in storage, and the net returns that accrue to each alternative withdrawal rate in each groundwater state. Results of this approach are compared to

withdrawal levels generated by a recursive linear programming model which assumes that individual irrigators pose pumping decisions on their own shortrun returns. Results indicate that the optimal withdrawal decision is not sensitive to a shift from a 4 to 8% discount rate. (Schroeder-Wisconsin)
W74-12787

AQUACULTURE IN ALASKA.
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 5E.
W74-12791

SOCIOECONOMIC IMPACTS OF THE FEDERAL RECLAMATION PROGRAM IN THE UNITED STATES,
Bureau of Reclamation, Washington, D.C. Economics and Statistics Branch.
A. D. Nielsen, and L. D. Walker.
Report (undated). 11 p. 9 ref.

Descriptors: *Water resources development, *Federal Reclamation Law, *Income, *Project benefits, Recreation, Capital costs, Economic impact, Regional economics, National income, Investment, Employment, Social aspects, Environmental effects.
Identifiers: Bureau of Reclamation.

Since the creation of the Federal Reclamation program in 1902 a total of $5.5 billion has been invested in over 222 storage reservoirs, 134 diversion dams, 7,612 miles of water carriage facilities, 19.651 lateral miles, 109 pumping plants, 50 power plants, 300 substations, 16,200 circuit miles of transmission lines and 9,861 miles of project drains. Studies of Federal Reclamation projects indicate that sizeable socioeconomic impacts in the U.S. have resulted through the demands arising from construction activities and the recurring social, environmental and economic impacts from project operations. An examination of three reclamation dams and power plants illustrate the pervasiveness of socioeconomic impacts of construction. These projects provided 96 man-years labor--58 representing indirect offsite employment exclusive of multiplier effects, per $1 million of construction costs. Once the structures are completed a steady stream of national, state, and local annual benefits recur. One recent Bureau of Reclamation study indicates increased business activity, personal income and corporate profits of (in million dollars) 4,260.5, 2,645.7 and 499.5, respectively, resulting from federal reclamation projects in fiscal 1971. The socioeconomic impacts of reclamation projects on state and local governments, technological changes and recreational activities, are also discussed. (Schroeder-Wisconsin)
W74-12793

AN ECONOMIC EVALUATION OF IRISH SALMON FISHING. I: THE VISITING ANGLERS,
Economic and Social Research Inst., Dublin (Ireland).
R. O'Connor, and B. J. Whelan.
Paper No 68, February 1973. 66 p. 1 fig, 20 tab, 13 ref, append. A, B.

Descriptors: *Sport fishing, *Economic impact, *Evaluation, *Salmonids, Recreation demand, Fishing, Salmon, Sport fish, Monetary benefits, Income.
Identifiers: *Ireland, Foreign anglers.

In 1970, 3.5 million lbs. of salmon valued at 1.2 million pounds sterling, and 60,650 lbs. of sea trout were caught in the Republic of Ireland by commercial and sport fishermen. The economic impact on Ireland of this growing fish harvest by foreign anglers is assessed. A stratified random sample, picked from the 1970 salmon licenses issued by the 17 administrative fishing districts, was utilized. Variable sampling fractions were applied to ensure sufficient numbers of anglers in each district. Out of 790 postal questionnaires sent out, 430 useable were returned. Economic impacts examined include total expenditures by foreign anglers within each region and the nation. Total expenditures are also expanded utilizing a national multiplier to assess the full value added. Results indicate that 3,800 salmon/sea-trout anglers visited the Irish Republic in 1970. In all, salmon anglers made 14,000 visits, over 8,000 of which were day trips. The survey indicated that salmon angling is primarily a sport of the well-to-do foreign angler and a pastime enjoyed by more elderly people. Total expenditures by foreign salmon anglers in 1970 was estimated at 696,000 pounds sterling and by assuming a national multiplier of 1.6, total value added was estimated at 829,000 pounds sterling. (Schroeder-Wisconsin)
W74-12796

WATER RESOURCE PROBLEMS AND RESEARCH NEEDS OF NEW MEXICO,
New Mexico State Univ., Las Cruces. Water Resources Research Inst.
B. J. Creel.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 279, $4.25 in paper copy, $2.25 in microfiche. Report No 045, July, 1974. 75 p, 2 fig, 5 tab, 31 ref. OWRT A-041-NMEX(1).

Descriptors: *Research priorities, *Project planning, Water resources institute, Planning, Research and development, *New Mexico, *Coordination.
Identifiers: *Priority ranking, *Information dissemination.

There are many water problems in the State of New Mexico, and research of many kinds will be required in order to solve them. The purpose of this study has been to obtain information that will aid in the development of a coordinated program of water resources research in New Mexico. In the field of water resources, a research tradition has not yet fully developed which would allow the communication and research planning necessary between researchers and the water management practitioners that would provide timely, beneficial, and usable information to the potential users. Frequently, potential researchers are not sufficiently aware of the various water problems in enough detail to formulate a research investigation, or they are unaware that a particular problem exists and those experiencing water problems are unaware of the contribution a researcher could make. Researchers and water management practitioners often are unaware of each other's efforts. Solutions to particular problems may have been found, and in some cases may be well known, but are not being applied. This study is an attempt to inventory and rank the problems, indicate the research needs, and aid in the coordination of water resources projects in the State of New Mexico. (Hain-New Mexico State)
W74-12864

DEVELOPMENT OF CRITERIA FOR EVALUATING URBAN RIVER SETTINGS FOR TOURISM-RECREATION USE,
Texas A and M Univ., College Station. Water Resources Inst.
C. A. Gunn, J. W. Hanna, A. J. Parenzin, and F. M. Blumberg.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 290, $4.75 in paper copy, $2.25 in microfiche. Technical Report No 56, June, 1974. 98 p, 66 fig, 5 tab, 39 ref. OWRT A-021-TEX(1). 14-31-0001-3844, 14-31-0001-4044.

Descriptors: *Planning, *Texas, *Recreation, *Cities, Sites, *Motivation, Attitudes, Evaluation.
Identifiers: San Antonio(Tex), *San Antonio River Walk(Tex).

An earlier study, 'Cultural Benefits from Metropolitan River Recreation-San Antonio Prototype,' (see W73-03270) revealed that urban water resources can be successfully developed for tourism and recreation. The San Antonio River Walk is a unique demonstration of a new amalgam different from either parks or tourist business clusters. It draws upon both for success. It shows the synergistic effect of a park/business mix. Because few other cities have created a park/business complex from their downtown water resources, the purpose of this study is the development of criteria through which cities may evaluate their potential for this use. The general guidelines offered will require special adaptation to local conditions. Three phases of investigation are recommended: Preliminary investigation; study of motivating forces, site factors and other influential factors; and planning and implementation. Preliminary Investigation: This step should identify and perceive anew the water resources of downtown. Water resources within a five-minute walking distance of the central business district have the greatest potential for park/business development. Motivating Forces: One or several motivating forces are important in influencing either interest in or actual development of an urban water-oriented park/business complex. Preservation organizations can provide valuable support for such a development if their orientation is conservation and human use rather than strict preservation. Site Factors: The investigation of the site should begin with an analysis of existing development.
W74-12866

ECONOMIC ASPECTS OF THE SYSTEMS APPROACH TO WATER MANAGEMENT,
For primary bibliographic entry see Field 6A.
W74-13017

INDUSTRIAL ECONOMIC MODEL OF WATER USE AND WASTE TREATMENT FOR AMMONIA,
Houston Univ., Tex.
For primary bibliographic entry see Field 5D.
W74-13020

MULTIOBJECTIVES IN WATER RESOURCES SYSTEMS ANALYSIS: THE SURROGATE WORTH TRADE OFF METHOD,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Systems Engineering.
For primary bibliographic entry see Field 6A.
W74-13023

DECISION MAKING UNDER UNCERTAINTY ECONOMIC EVALUATION OF STREAMFLOW FORECASTS,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 4A.
W74-13044

A CONCEPTUAL AND EMPIRICAL ANALYSIS OF WATER PRICING IN MISSISSIPPI MUNICIPALITIES,
Mississippi Univ., Oxford. Bureau of Business and Economic Research.
K. W. Hollman, and W. E. Boyet.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-236 45 $3.75 paper copy, $2.25 in microfiche. Mississippi Water Resources Research Institute, Mississippi State, Completion Report, July 1974. 31 p, 3 fig, tab. OWRT A-079-MISS (1).

Descriptors: *Water costs, *Pricing, *Water rates, Management, *Mississippi, *Regression analysis, *Municipal water, Cities, City planning, Benefits, Water allocation(Policy), Decision making.

The project focused on some of the significant economic questions concerning water pricing in Mississippi. The objectives were: (1) to analyz

he characteristics and pricing policies of the water ndustry in Mississippi cities; (2) to evaluate the ricing policies of these municipalities from an conomic viewpoint, and to suggest more desira- le rate making alternatives; and (3) to formulate a ultiple regression model which would help deter- nine the variables currently affecting water prices n Mississippi municipalities. A subset of 86 water ystems in Mississippi was used for data upon hich the multiple regression analysis was based. f the 20 possible determinants of water prices hich were initially considered, six proved to be tatistically significant. The results show that mu- icipal water pricing methods in Mississippi are ighly arbitrary and basically of a non-cost orien- ation. A few selected but profound changes in the irections outlined in the theory section of the tudy could lead to a more equitable allocation of ater resources and to more social benefits rough better water pricing decisions. The infor- ation gained from the study should be helpful to unicipal water officials in planning and structur- g water rates.
74-13054

AN AND WATER, THE SOCIAL SCIENCES N MANAGEMENT OF WATER RESOURCES.
entucky Univ., Lexington. Water Resources st.
he University Press of Kentucky, Lexington, entucky. 1974, 258 p. L. D. James, editor, $10.50. WRT A-999-KY(1).

escriptors: *Water resources, *Management, Decision making, Administration, Economics, Social aspects.
dentifiers: *Social sciences, Anthropology, Geog- aphy, Political science.

his book is designed to help social scientists con- ibute more effectively to the formulation of ater management policy, thus it has relevance to any issues in the application of technology to roblems of widespread current concern. Five so- ial scientists, representing the fields of nthropology, economics, geography, political cience, and sociology, review the contributions eir disciplines have made to water resources anagement and suggest ways in which such con- ibutions might be extended. The remaining chap- rs include responses to the five papers by per- ons familiar with the practical problems of water anagement and a general assessment of the iscussion by the editor. (See also W74-13059 thru 74-13064) (Huffsey-Kentucky)
74-13058

HE CHALLENGE TO THE SOCIAL CIENCES,
eorgia Inst. of Tech., Atlanta. Environmental esources Center.
. D. James.
n: Man and Water, The Social Sciences in anagement of Water Resources, ed. by L. D. ames, The University Press of Kentucky, Lex- gton, p 1-33, 1974. 1 tab, 46 ref.

escriptors: Water resources, *Water resources evelopment, *Management, Water, Economics, ater utilization, Resources, Water policy, esources development, Comprehensive lanning, Multiple purpose projects, Research and evelopment, Social aspects, Planning, Social im- act, Social needs, Value, Social function, Social alues, Social change.
dentifiers: *Social sciences, Anthropology, Politi- al science, Sociology, Geography.

Water refurces management provides a con- enient context for discussing obstacles to team- ork among social scientists, technical experts, nd decision-makers. Social scientists must more ffectively contribute their expertise in formulat- g management policy so that management ailures may be fewer and successes may be requent. Water resources management suffers as alternatives are overlooked, consequences are unforeseen, the wishes of the people are misunderstood, formulated policy is ineffectively implemented, or the consequences of installed projects are not recognized. Improving water resources management relates to the general issues of how conscious social change can or should be used to direct the development and adoption of technological innovation and of how to improve the probability that social choices will truly be in the best long-range interest of mankind. Social scientists must develop models to predict differences in effects among alternatives. Better procedures for using available information must also be found. Blending the contributions of technology and the social sciences and incorporating sound theories into practical applications will be required, but the most difficult task may be getting people from diverse backgrounds to work together. (See also W74-13058) (Grden-North Carolina)
W74-13059

ANTHROPOLOGICAL CONTRIBUTIONS TO THE CULTURAL ECOLOGY AND MANAGEMENT OF WATER RESOURCES,
Washington Univ., Saint Louis, Mo. Center for the Biology of Natural Systems.
J. W. Bennett.
In: Man and Water, The Social Sciences in Management of Water Resources, ed. by L. D. James, The University Press of Kentucky, Lexington, p 34-81, 1974. 81 ref.

Descriptors: Water resources, *Water resources development, *Management, *River basins, Water utilization, Water policy, Resources development, Social impact, Social needs, Social function, Social values, Social change, *Environment, Ecology, Resources.
Identifiers: *Anthropology, *Social sciences, Archaeology, Geography, Civilization, Ethnology, Society, Values, Micro-environment, Human ecology, Hydraulic society, Cultural history, Negev, Sinai Peninsula.

Anthropoligists study water resources as a by-product of research on cultural history and human subsistence, not as a topic in its own right. However, anthropological research can contribute to practical applications in resource management and development. Studies of small-scale water development systems associated with contemporary tribal and peasant societies are the most frequently occurring water research. Archaeological studies of areas inundated by large reservoirs have also played an important role in the development of the discipline and have made contributions to the study of man's use of riverine resources and topography. Of greater significance for water resources management are studies on the water utilization and development schemes of prehistoric and proto-historic peoples. Archaeological studies of water shortage systems in Bronze and Iron Ages in the Negev and Sinai Peninsula have been used as models for modern agrarian development schemes in Israel. The anthropologist is often the person most informed about microenvironments and microcultural features affecting natural resource usage. He is, therefore, in an excellent position to advise planners on the geographic, technological, and sociocultural feasibility of proposed changes. Thus, the anthropologist may find a role in exploring relationships among values, technology, and the uses of nature. (See also W74-13058) (North Carolina)
W74-13060

ECONOMICS AND ECONOMISTS IN WATER RESOURCE DEVELOPMENT,
Wisconsin Univ., Madison. School of Natural Resources.
S. C. Smith.
In: Man and Water, The Social Sciences in Management of Water Resources, ed. by L. D. James, The University Press of Kentucky, Lexington, p 82-101, 1974. 12 ref.

Descriptors: *Cost-benefit analysis, *Systems analysis, Water resources, *Water resources development, *Economics, Water utilization, Water policy, Resources development, Research and development, Social impact, Social values, Economic efficiency, Economic feasibility, Economic impact, Economic justification, Economic life, Economic rent, Forecasting, Optimum development plans, Planning, Income distribution, Project planning, Simulation analysis, Input-output analysis, Cost analysis, Cost allocation.
Identifiers: *Social sciences, Quantitative techniques, Holistic approach.

The economist's role in the water resources field includes establishing criteria for evaluating development, for deciding whether development is appropriate, and for deciding which development design is optimum. Their criteria have been only partly successful; the social context has not been adequately assessed, and economic models are rudimentary in simulating the effects of technological and biological relationships. Economists have developed an economic rationale for considering development alternatives; the benefit-cost analysis, which says that national income increases when benefits exceeds costs in a program, has been incorporated into the decision-making process. 'Who should pay and how' has not been as interesting to economists as determining project optimality, formulation, and contribution to the national economy; however, such financial analysis is emerging as a concern for them. Economists have also aided in suggesting organizational arrangements to make water management more responsive to demand patterns. Quantitative techniques of operations research, input-output analyses, and systems analysis have helped solve water management problems. Economists can also develop economic incentives to achieve social objectives and develop systems of water management to respond to demand changes. (See also W74-13058) (Grden-North Carolina)
W74-13061

ROLE OF GEOGRAPHY IN WATER RESOURCES MANAGEMENT,
Colorado Univ., Boulder. Inst. of Behavioral Science.
G. F. White.
In: Man and Water, The Social Sciences in Management of Water Resources, ed. by L. D. James, The University Press of Kentucky, Lexington, p 102-121, 1974. 47 ref.

Descriptors: Water resources, *Water resources development, *Management, Water utilization, Water policy, Resources development, Social impact, Social value, Environment, Geographical regions, Geohydrologic units, River basin development, River systems, Floods, Flood data, Flood recurrence intervals, Comprehensive planning.
Identifiers: *Geography, *Social sciences, Social systems.

Geographical analysis especially pertinent to river development and water management includes atlas compilation of background data, homologues studies, and regional and historic studies of water management. Geographers can improve resources estimates by refining the mapping of water balance and by delineating hydrological characteristics of terrain and land use. In studying technological variations in water use and disposal, geographers have added knowledge about the location and spread of different management techniques. Some aspects of water management, such as pollution, have been overlooked by geographers, while others, such as floods, have received extensive attention. Geographers have also developed methods for estimating the effects of dams upon wildlife and recreational use, among other studies of social impacts of water management. Perhaps the distinguishing feature of geographers' contributions has been their holistic viewpoint; they can keep a team of researchers from overlooking

important aspects of relationships between natural and social systems in the area to be manipulated by water management. They are also experienced in examining the full range of choice open to society in dealing with water, including engineering projects as well as readjustments in patterns of land use, water use, or social constraints. (See also W74-13058) (Grden-North Carolina)
W74-13062

TOWARD A POLITICAL SCIENCE OF WATER RESOURCES DECISIONS,
Wisconsin Univ., Madison. Dept. of Political Sciences.
H. C. Hart.
In: Man and Water, The Social Sciences in Management of Water Resources, ed. by L. D. James, The University Press of Kentucky, Lexington, p 122-163, 1974. 73 ref.

Descriptors: Water resources, *Water resources development, *Management, *Political aspects, Water policy, Social impact, Social value, Resources development, Political constraints, Administration, Federal government, Governmental interrelations, Institutions, Jurisdiction, State governments, Local governments, Constraints, Institutional constraints, Cost-benefit analysis, *Decision making.
Identifiers: *Political science, *Social sciences, Public policy.

Contributions to water management from political science are not essential because of any distinct methodology; however, political scientists can contribute concepts concerning legitimate power, cleavage and consensus, and ways of seeking collective goals. Political scientists have done some work in this field, but the potential is largely unrealized. Water policy questions captured a larger share of attention from political scientists twenty years ago than they do now, and while political scientists were less prominently studying the politics and government of water in the 1960's, they were not altogether inactive. For example, case studies were written describing and evaluating the performance of federal and state water resource development efforts. However, this was also a period when economists led the field in improving basin-wide planning and investment decisions using cost-benefit analysis. One other reason political scientists have not been fully engaged in water research problems is that contributions to practical decisions and contributions to theories of politics have become separated at a stage when they must depend heavily upon one another. Perhaps the rapidly growing sub-field of public policy, which can link applied and theoretical work, is the key to the problem. (See also W74-13058) (Grden-North Carolina)
W74-13063

RECENT SOCIOLOGICAL CONTRIBUTIONS TO WATER RESOURCES MANAGEMENT AND DEVELOPMENT,
Kentucky Univ., Lexington. Center for Developmental Change.
S. Johnson.
In: Man and Water, The Social Sciences in Management of Water Resources, ed. by L. D. James, The University Press of Kentucky, Lexington, p 164-199, 1974. 62 ref.

Descriptors: Water resources, *Water resources development, *Management, *Social values, Social impact, Social aspects, Social needs, Social change, Social function, Water, Water utilization, Pollution, Water policy, Resources development, Research and development, Social mobility, Urban sociology, Community development, Social adjustment, Social participation, Motivation, Rural sociology, Attitudes.
Identifiers: *Social sciences, *Sociology, Society, Social environment.

Water resources decisions are social in nature and result from the complex interaction of water resource needs, kind of development proposed, types of institutions needed to implement the development, types of communities affected, and the matrices of values, attitudes, and goals of all those involved. Sociologists conduct community studies as their predominant type of water-related research. They can help solve the pollution problem through theoretical study of value bases leading to wasteful water use or to water pollution. Other examples of water programs needing further study by sociologists include community integration in water resources development, the social consequences of solving water problems with innovative technology, effects of knowledge about water projects on attitudes, the conservation movement, and the characteristics associated with resistance to change. The question of professional incentives and rewards for participating in water-related research is touchy; many sociologists are reluctant to enter applied sociology due to sociology's 'fledgling science' status and to a fear that pure science cannot be advanced by practical application. For sociological research on water resources to continue as it should, institutional constraints, such as the reward-and-status system must be altered, and the scientific status of research must be improved. (See also W74-13058) (Grden-North Carolina)
W74-13064

THE IMPACT OF MAN-MADE LAKES ON RESIDENTIAL PROPERTY VALUES: A CASE STUDY AND METHODOLOGICAL EXPLORATION,
Toronto Univ. (Ontario), Dept. of Geography.
J. C. Day, and J. R. Gilpin.
Water Resources Research, Vol 10, No 1, p 37-43, February, 1974. 3 fig, 5 tab, 17 ref.

Descriptors: *Water resources development, *Reservoirs, *Economic justification, *Land use, *Canada, Lakes, Natural resources, Recreation, Aesthetics, Attitudes, Recreation demand, Recreation facilities, Social aspects, Social participation, Regression analysis, Statistical methods, Project planning, Estimated benefits, Land development.
Identifiers: Ontario, *Don River(Ontario), G. Ross Lord Dam(Ontario), Man-made lakes.

Dams, reservoirs, and associated parks are often partially justified on the basis that they will induce increased property values. This assumption is tested using the G. Ross Lord Dam built as an important component of the Don River basin flood control system and the associated 315 acres of parkland on the west branch of the Don River in Toronto. The area surrounding the reservoir had become urbanized by 1972 when dam construction began. A variety of housing, university research centers, a library and an arena have been constructed. Results showed that residents near the damsite did not know about the project proposal when they moved in, did not feel the valley parkland is an important benefit to the area, placed little importance on the proposed parkland and reservoir when making the choice to live in the study area, and did not believe that the reservoir project would cause major changes in residential property values. Most interviewees who did value parkland owned land contiguous to it. Therefore, planning agencies that justify reservoirs on the basis of an intangible land value enhancement should indicate that only a small area adjacent to the lake will be affected. The magnitude of the benefits will be influenced by the size and aesthetic qualities of each particular lake. It is also proposed that similar studies with more elaborate regression models be repeated in 1977 and 1982 to determine if property value changes have occurred since construction; it is obvious that the dam and the park had no effect on residential property values during construction. (Grden-North Carolina)
W74-13066

NEW ENERGY TECHNOLOGY RESEARCH AND DEVELOPMENT: A RATIONALE FOR SETTING PRIORITIES,
California Univ., Livermore. Lawrence Livermore Lab.
C. J. Anderson, and E. Behrin.
Available from NTIS, Springfield, Va. 22161 as UCRL-51589; $3.25/copy, $2.25/microfiche. Report No UCRL-51589, May 15, 1974. 17 p, 4 fig, 6 tab.

Descriptors: *Energy, Technology, Projects, *Research and development, *Fossil fuels, Nuclear energy, Coals, Oil, Oil industry, Oil shales, Secondary recovery(Oil), Natural resources, Gasoline, Gases, Hydraulic engineering, Reactors, Benefit-cost analysis, Costs, *Research priorities.

The United States can no longer continue using energy at its present rate, keep energy prices low, protect the environment, and remain independent of foreign suppliers. The issue of U.S. energy independence has acquired deep significance. Intense research and development are required to replace imported oil with environmentally acceptable equivalents. Those technologies capable of providing significant new energy by 1985 are examined. They deal primarily with increased utilization of fossil resources because only the continued use of fossil fuels can provide the energy required in this period. Long-range energy sources may include breeder reactors, fusion reactors (magnetic confinement and laser fusion), conversion of solar energy to power, bioconversion (plants and bacteria), and low-temperature hydrogen production. In a broader perspective, near-term technologies are meaningful because they can provide adequate time to develop long-range energy technologies. Although near-term technologies should have a higher priority than long-range research in a national program, efforts in both should be increased. (Houser-ORNL)
W74-13123

TECHNICAL AND SOCIAL ASPECTS OF NUCLEAR WASTE DISPOSAL IN WESTERN EUROPE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
For primary bibliographic entry see Field 5D.
W74-13135

NATURAL RESOURCE INVENTORY FOR URBAN PLANNING UTILIZING REMOTE SENSING TECHNIQUES,
Arizona Univ., Tucson. Office of Arid Lands Studies. Office of Arid Lands Studies. Arizona Univ. Tucson.
K. E. Foster, D. F. Mackey, and C. D. Bonham.
OALS Bulletin 3, October, 1972. 14 p. 1 fig, plates. 2 ref. NASA Grant No NGL 03-002-313.

Descriptors: *Remote sensing, *Hydrologic data, *Vegetation mapping, *Ephemeral streams, *Urban mapping, *Soil surveys, *Arizon. A, royos, Flooding, Channel morphology, Data collections.
Identifiers: Pantano Wash(Ariz).

Remote sensing techniques were used to map existing vegetation, soil and hydrologic conditions along the lower Pantano Wash area of Tucson, Arizona. Information gathered is being used for urban environmental planning in the Pantano Wash area. The basic purpose of the study was to explore the potential of remote sensing techniques as a tool for planners. Hydrologic changes along the wash due to urbanization were evident when photographs over a 35-year period were compared. Vegetation characteristics and their distribution are available in map form. (Mastic-Arizona)
W74-13143

ETHODS AND PROBLEMS OF ESTIMATING ATER-QUALITY BENEFITS,
vironmental Protection Agency, Washington, C. Office of Research and Development.
r primary bibliographic entry see Field 5G.
74-13219

IE ENVIRONMENT AND WATER-SOURCE DEVELOPMENT,
tional Wildlife Federation, Washington, D.C.
r primary bibliographic entry see Field 5G.
74-13221

ATER QUANTITY AND QUALITY MANAGE-ENT IN THE RUHR VALLEY,
hrverband und Ruhrtalsperrenverein, Essen est Germany).
r primary bibliographic entry see Field 5G.
74-13424

E OF DRAINAGE PATTERNS AND DENSI-ES TO EVALUATE LARGE SCALE LAND EAS FOR RESOURCE MANAGEMENT,
nnesota Univ., St. Paul. Dept. of Horticultural ience.
r primary bibliographic entry see Field 4A.
74-13453

C. Cost Allocation, Cost Sharing, Pricing/Repayment

ANAGEMENT OF FISHERY RESOURCES R OPTIMUM RETURNS. WOULD IT WORK THE GULF OF MEXICO,
ode Island Univ., Kingston. Law of the Sea t.
C. Herrington.
Proceedings of the 24th Annual Session Gulf d Caribbean Fisheries Institute, November 71, Rosenstiel School of Marine and At-spheric Science, University of Miami, Coral les, Florida, p 33-41.

scriptors: *Marine fisheries, *Decision making, ish management, Regulation, Fish conserva-n, Wildlife management, International waters, litical aspects, Institutional constraints, Interna-nal commissions, Law of the Sea, Fish harvest, ulf of Mexico.
entifiers: Common property, Optimum returns.

thin the past half century substantial changes in marine fishery management objectives have curred. The concept of maximum sustainable ld formally stated as a management objective at 1949 Northwest Atlantic Fisheries Conven-n, has been a widely accepted good in interna-nal fishery management. As a practical measure wever, it has been successfully implemented ly in the North Pacific Halibut, Sockeye Salmon d Inter-America Tropical Tuna Commissions. A cond objective--maximum economic yield--has o emerged. During the 1950's economists vealed that substantial world-wide surplus fish-g capacity existed which could be reduced rough limitation of seasons, fishing days, or strictions on gear. Implementation of many pro-ams is difficult because of the social, economic, d political implications of managing a common operty resource. A third approach reviewed en-mpasses a mix of biological, social, economic d political considerations. Implicit in this ap-oach are broad decision processes which include variety of interest group. Such an approach may d to varying fishery policies between countries ndering uniform international agreement. Many the problems involved in each of these ap-oaches center on the treatment of the fisheries a common property. Effect of two proposals--enses and lease--on achievement of the above jectives is discussed. (Schroeder-Wisconsin)
74-12766

UNCLE IS MOVING IN,
National Canners Association, Washington, D.C. Fishery Products Committee.
For primary bibliographic entry see Field 6E.
W74-12769

INDUSTRY ACTIVITIES IN RESPONSE TO THE HEAVY METALS PROBLEM IN SEAFOODS,
National Fisheries Inst., Inc., Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-12771

THE DESIGN OF AN AQUACULTURE ENTERPRISE,
Foods MultiNational, Inc., Groton, Mass.
For primary bibliographic entry see Field 8I.
W74-12773

THE LOBSTER FISHING INDUSTRY OF MT. PLEASANT, BEQUIA ISLAND, WEST INDIES,
Minnesota Univ., Duluth. Dept. of Geography.
J. E. Adams.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 126-133. 2 fig, 4 tab.

Descriptors: *Marine fisheries, *Water resources development, *Lobsters, Regional development, Fish conservation, Social aspects, Foreign countries, Foreign waters.
Identifiers: *Bequia Island(British West Indies), *British West Indies, Grenadine Islands, Spiny lobster.

The fish industry of the northernmost island of the Grenadine Archipelago is surveyed. The trade-wind swept island hills are useless for agriculture and until 1950 no significant trade ocurred for the spiny lobsters found in the island's coastal waters. In early 1950 Martinique began purchasing a variety of marine products including the spiny lobsters from Bequia fishermen. With Martinique picking up and storing the product, lobster fishing in Mt. Pleasant was generally on a small scale often consisting of one oarsman and 2 divers. Technical advances involved changes from homemade spears, to arbaletes--a French sling-powered harpoon, to wire snares. Conservation efforts within the islands were limited, generally to protecting breeding stock but placing no restriction on the number of legal size specimens that could be caught in the open season, resulting in a serious depletion of the lobster. Changes in the marketing structure have also adversely affected the industry. Since 1959 Mt. Pleasant fishermen have had to deliver their catches to St. George, Grenada. In 1965 the wholesale value of their lobster catch was $5000-6000 (British West Indies dollars.) Approximately one-half of this amount was spent on the 2 transport vessels, leaving only a small amount for the fishermen. (Schroeder-Wisconsin)
W74-12774

WHO BEARS THE COST OF POLLUTION CONTROL. THE IMPACT ON THE DISTRIBUTION OF INCOME OF FINANCING FEDERALLY REQUIRED POLLUTION CONTROL,
Public Interest Economics Center, Washington, D.C.
N. S. Dorfman, and A. Snow.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-226 447, $5.75 in paper copy, $2.25 in microfiche. Council on Environmental Quality and Environmental Protection Agency, Washington, D.C., Report August 1973. 130 p, 11 fig, 24 ref. EQC 310.

Descriptors: *Cost transfer, *Pollution abatement, *Legislation, *Cost analysis, *Distribution, Equity, Income analysis, Federal government, Financing, Industries, Air pollution, Taxes, Economic impact, Budgeting, State governments.
Identifiers: *Pollution control costs, Automobile emission control, Service charges.

Federal pollution control legislation enacted by the end of 1972 may cost taxpayers over $26 billion by the end of the decade. The distribution of these additional costs among various income groups is assessed for 1972, 1976 and 1980. Estimates by the Council on Environmental Quality and the Environmental Protection Agency of the total costs are taken as given. Costs of antipollution measures are divided into three categories as those undertaken directly by alternative governmental levels; those which private industry must undertake; and those undertaken by the public for automobile emission controls. For these categories the percent distributions of annual costs were 31.4, 37.2 and 31.4 for 1972; 39.6, 30.4, and 30.0 for 1976; and 21.9, 41.9, and 36.2 for 1980, respectively. The relative impact on the costs distribution among income groups under the financing systems of each government level is also discussed. Two general approaches to measure the cost distribution among income groups are: an estimate of the average dollar costs per family unit, and an estimate of the effective tax rate for each group. Total estimated distributed costs per family unit range from $12 to $296 for 1972; $73 to $2,251 for 1976; and $84 to $1,511 for 1980. (Schroeder-Wisconsin)
W74-12781

THE POLITICAL INFLUENCE OF RESIDENTIAL CONSUMERS ON WATER RATES,
West Virginia Univ., Morgantown. Dept. of Economics.
P. Mann.
Water Resource Bulletin, Vol 9, No 5, p 976-984, 1973. 3 tab, 12 ref.

Descriptors: *Public utilities, *Water rates, *Regulation, Use rates, Political aspects, Administration, Water works, Pricing, Regression analysis.
Identifiers: Consumer leverage.

The regulatory process which determines water rates might be viewed as a bargaining process between regulator, utility managers, and consumers involving political, institutional, and economic influences. To illustrate that utility rates are a function of each, a large sample of publicly owned water utilities were subjected to linear regression analysis based on data collected for 335 publicly owned water utilities. Results indicate that cost and cost related factors were significant determinants of residential water rates. The political influence variable utilized the ratio of actual voters to population of voting age, emerged as significant only for minimum charges. Politically active constituencies receive price concessions reflected only for the minimum consumption level. The political activity-price linkage was also found more evident in small utilities than in large firms. The statistical analysis considered only the influence on water rate structures rather than rate levels. It may be, therefore, that the determination of a utility's total revenue requirements are but little influenced by political factors. Rather factors such as capital attraction and satisfactory operation probably will dominate revenue requirements. (Schroeder-Wisconsin)
W74-12786

THE WATER RESOURCES COUNCIL'S PROPOSED PRINCIPLES AND STANDARDS--AN ECONOMIC COMMENT,
University of Southern Mississippi, Hattiesburg. Dept. of Economics.
D. C. Williams, Jr., and C. P. Cartee.
Water Resources Bulletin, Vol 9, No 4, p 711-716, 1973. 2 fig, 1 ref.

Descriptors: *Project benefits, *Measurement, *Evaluation, *Recreation, Analytical techniques, Recreation demand, Water resources development.
Identifiers: *Water Resources Council, Economic benefits.

The expansion of objectives in natural resources planning lead the Water Resources Council in 1971 to propose a new set of principles and standards by which to evaluate projects. Two of the economic tools suggested by the Council are criticized. First, benefits arising from such projects were defined as equal to the total value of the increase in national output--the resultant consumer surplus plus the market price times increased quantity. Such a measure assumes that the seller could price discriminate, a condition not exhibited in the existing market. It is argued that increases in gross national product is a better measure of resultant benefits. A second proposal of the Council challenged is their assessment of recreational benefits. The Council's methods of simulating a price per recreation day implies that an arbitrary price be selected from a range and multiplied times the number of days demand at no charge. This method overstates the economic benefits because it does not consider that demand is a function of price. The real market would increase the benefits by multiplying the selected price times the quantity demanded at that price. (Schroeder-Wisconsin)
W74-12794

COSTS OF LAND SUBSIDENCE DUE TO GROUND WATER WITHDRAWAL,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 4B.
W74-12867

COST OF SPRAY IRRIGATION FOR WASTE WATER RENOVATION,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12889

FINANCING MUNICIPAL WASTE WATER TREATMENT FACILITIES, INCLUDING LAND UTILIZATION SYSTEMS,
Environmental Protection Agency, Washington, D.C. Div. of Municipal Waste Water Programs.
For primary bibliographic entry see Field 5D.
W74-12890

LARGE WASTEWATER IRRIGATION SYSTEMS: MUSKEGON COUNTY, MICHIGAN AND CHICAGO METROPOLITAN REGION,
Bauer Engineering, Inc., Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-12891

OPTIMAL REGIONALIZATION OF WASTEWATER TREATMENT FOR WATER QUALITY MANAGEMENT,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-13048

POWERS OF THE STATE OF KENTUCKY IN IMPLEMENTING AN EFFLUENT TAX AS A PART OF AN INTERSTATE OHIO RIVER BASIN WATER POLLUTION CONTROL PROGRAM,
Kentucky Univ., Lexington. Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W74-13051

A CONCEPTUAL AND EMPIRICAL ANALYSIS OF WATER PRICING IN MISSISSIPPI MUNICIPALITIES,
Mississippi Univ., Oxford. Bureau of Business and Economic Research.
For primary bibliographic entry see Field 6B.
W74-13054

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
For primary bibliographic entry see Field 5D.
W74-13071

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
For primary bibliographic entry see Field 5D.
W74-13072

ENVIRONMENTAL ASSESSMENT OF WATER-SYSTEM IMPROVEMENTS,
East Bay Municipal Utility District, Oakland, Calif.
For primary bibliographic entry see Field 5G.
W74-13265

RECOVER ALUM TO REDUCE WASTE-DISPOSAL COSTS,
Metcalf and Eddy, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-13285

THE ECONOMIC VALUE OF WATER FOR WASTE DILUTION: REGIONAL FORECASTS TO 1980,
Colorado State Univ., Fort Collins. Dept. of Economics.
For primary bibliographic entry see Field 5B.
W74-13297

EFFLUENT CHARGES-A PRICE ON POLLUTION,
Pennsylvania State Univ., University Park. Center for Air Environment Studies.
For primary bibliographic entry see Field 5G.
W74-13320

6D. Water Demand

WATER RESOURCES DISTRIBUTION OPTIMIZING,
C. Parvulescu.
Mimeo, n.d., 48 p.

Descriptors: *Water demand, *Water resources, *Water allocation(Policy), *Optimization, Waste water disposal, Economics, Technology, Water resources development, Water reuse, Industries, Mathematical studies, Stochastic processes, Dynamic programming, Optimum development plans, Water distribution(Applied), Water delivery, Water pollution effects, Water works, Pricing, Algorithms.
Identifiers: *Rumania.

The stochastic nature of natural flows, multiple conflicting user requirements and the varying impacts of prior uses on water quality have all lead to increasing demands for improved water management techniques. A modeling effort is proposed to analyze optimum combinations of users, modes of water distribution, recycling and treatment; and to establish the transition time of water flows. The procedure includes optimization through the minimization of design costs subject to given design criteria. Basic to the approach is the maximum utilization of positive impacts of internal recycling; the direct association of quantitative and qualitative aspects of water management and the utilization of prices to optimally allocate resources. A digital computation process with discreet values, digital simulation and dynamic programming procedures is used to form the required relationships under uncertainty. A series of models differentiated by the location of users--parallel, series; flow regime--natural or controlled; or the relative weight of qualitative versus quantative aspects is presented. Two algorithms yielding allocation pricing, treatment and recycling levels of water are discussed. A numerical example illustrating differences between the existing and proposed management tools is provided. (Schroeder-Wisconsin)
W74-12783

A STUDY OF HOW WATER QUALITY FACTORS CAN BE INCORPORATED INTO WATER SUPPLY ANALYSIS,
Ernst and Ernst, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-13030

THE IMPACT OF MAN-MADE LAKES ON RESIDENTIAL PROPERTY VALUES: A CASE STUDY AND METHODOLOGICAL EXPLORATION,
Toronto Univ. (Ontario), Dept. of Geography.
For primary bibliographic entry see Field 6B.
W74-13066

ARIZONA'S WATER RESOURCES,
Arizona Water Commission, Phoenix.
P. Briggs.
Arizona Engineer, Vol 26, No 7, p 5, 25, July, 1974.

Descriptors: *Water management(Applied), *Water demand, *Groundwater resources, Water resources development, *Colorado River, *Arizona, Groundwater, Surface waters, Wells, Aquifers.
Identifiers: *Central Arizona Project, Harquachola Valley.

Growth in Arizona's population is placing increased demand on the state's water supply. Potential water supplies lie with the vast underground storage still available and further development of Colorado River rights. Some of the demands can be absorbed through water conservation and transfer of water for different uses. Much of Arizona's groundwater supplies are located away from the areas of greatest need. A need is evident for development of statewide management plans for the water resources such as the Central Arizona Project. Until these plans are developed and inplemented, uses of the present water supply must be carefully analyzed and developed to aid and protect the public's needs. (Mastic-Arizona)
W74-13152

CLOUDS IN THE CRYSTAL BALL,
California Inst. of Tech., Pasadena. Dept. of Environmental Engineering.
J. E. McKee, and T. R. Rice.
Journal of the American Water Works Association, Vol 66, No 5, p 265-269, May, 1974. 3 fig, 3 tab, 8 ref.

Descriptors: *Population, *Forecasting, *Future planning(Projected), Water supply, Water reuse, Water conservation, *Nevada, Demand, *Water demand.
Identifiers: *Las Vegas(Nev.)

Population forecasting has become increasingly important in recent years. Various planners, including water-utility planners, need to know what future populations will be in areas that they serve in order to assure that people will be provided with

needed facilities. Water supply is one of many factors that influences the growth of United States communities. Moreover, social factors such as unemployment, crime, congestion, and racial problems may prove to be more significant than physical influences. A case study of the Las Vegas area shows that growth there will not be curtailed by a shortage of water. Even with a forecast of one million people by 2000 A.D., adequate water will be available for municipal use. Thereafter it may become necessary to reclaim, demineralize, and reutilize waste water for potable purposes. (Sandoski-FIRL)
W74-13277

FEASIBILITY STUDY FOR THE ESTABLISHMENT OF DALMAJ PILOT PROJECT,
Institute for Applied Research on Natural Resources, Bagdad (Iraq).
For primary bibliographic entry see Field 3F.
W74-13346

6E. Water Law and Institutions

STATE-COUNTY INTERAGENCY PROCEDURES FOR IMPOSING ENVIRONMENTAL QUALITY CONTROLS ON WATER-ORIENTED DEVELOPMENT ACTIVITIES,
Whittenburg, Vaughan Associates, Inc., Landover, Md.
For primary bibliographic entry see Field 5G.
W74-12751

COASTAL ZONE MANAGEMENT PROBLEMS.
Oregon State Univ., Corvallis. Water Resources Research Inst.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 470, $4.75 paper copy, $2.25 in microfiche. SEMN WR 018-74, January 1974. 90 p. OWRR A-999-ORE(16).

Descriptors: *Coasts, *Oregon, *Conservation, *Management, Regulation, Dredging, Regional development, Attitudes, Estuaries, Regional analysis, Estuarine environment, California, Institutions, Legislation, Institutional constraints.
Identifiers: Commissions.

The coastal zone, composed of the coastal plains, the continental shelf, bays, estuaries, lagoons and deltas is an area rich in natural resources and concentrated human activities. Lack of a comprehensive inventory of coastal resources, its unique and fragile nature, unbridled and poorly conceived development, increased population activities, uncontrolled harvesting of resources and limited local financial resources to facilitate adequate provision of public services within the zone are among the problems plaguing the coastal area. Dredging and filling have particularly affected the environment through altered water circulation, physical removal of organisms, nutrient releases, and increases in turbidity, suspended solids, and heavy metal levels. In part, coastal states have relied almost exclusively upon zoning and restrictive regulation to manage the zone; however their parochial nature and lack of a basis for comprehensive planning have generally made them inefficient as management tools. Two coastal commissions created in California and Oregon have been charged with the development of comprehensive enforceable plans for the orderly development of the zone. One management technique, a diversity approach, encourages clustering of development only within selected estuarine systems. Perceptions of preservation versus development of the zone held by local groups and a development agency are also discussed. (See W74-12757 thru W74-12765) (Schroeder-Wisconsin)
W74-12756

PROBLEMS ON CALIFORNIA'S COAST,
California Coastal Zone Conservation Commission, North Coastal Region, and California State Univ., Humboldt, Arcata.
D. W. Hedrick.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR 018-74, January 1974. p 21-28.

Descriptors: *Institutional constraints, *Coasts, *Regional development, California, Water resources development, Administrative agencies, Permits, State governments, Legislation, Conservation, Bodies of water.
Identifiers: *Coastal zone, Conservation commissions, Non-tidal bodies of water.

A 1972 California referendum created the California Coastal Zone Conservation Commission (CCZC) and six Regional Coastal Zone Conservation Commissions (RCZC) to study the coastal zone and to develop comprehensive, coordinated, enforceable plans for the orderly management and development of the area. An important element of the act was a permit system requiring permits 1000 yards landward from the mean high tide line and seaward to the three mile limit. Any 'development' must have a permit by a RCZC, or if appealed, confirmed by the CCZC. In sum, the CCZC has the overall coordinating role for planning development and hearing on appeal. While the state creates overall guidelines it is the responsibility of the six RCZC to effectively create the plan for adoption by the state. The North Coastal Region Commission's plan development has entailed grouping and studying of a number of interrelated resources including marine and coastal environment, recreation, power plant siting, and transportation. RCZCs also are required to formulate interim permit procedures. By August 1973, 152 administrative permits were approved; 8 were pending and none denied. Six exemptions were also approved. Of equal interest, more than 30 lawsuits have been filed by parties on both sides of the conservation issue. (See also W74-12756) (Schroeder-Wisconsin)
W74-12759

COASTAL ZONE LEGISLATION,
Oregon Univ., Eugene. Oregon Students Public Interest Research Group.
H. Richmond.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR -018-74, January 1974. p 81-85.

Descriptors: *Management, *Coasts, *Oregon, *Legislation, Regional development, Planning, Water resources development, Zoning, Institutions, Grants, Conservation, State governments.
Identifiers: Commissions.

The Federal Coastal Zone Management Act of 1972 (CZMA) and Oregon's Coastal Conservation and Development Commission (OCCDC), created in 1971 represent two attempts on the state and federal level to preserve, protect, restore and develop the nation's coastal zones' natural resources. Under CZMA, coastal states are eligible for federal grants to aid in the preparation of management programs for the states' coastal land and water resources. Such plans must include an inventory and designation of areas of particular concern within its coastal zone, delineation of impact of alternative land and water uses and a discussion of proposed control mechanisms to carry out suggested use management plans. In Oregon, the Oregon Land Conservation and Development Commission (LCDC) was provisionally designated to receive and administer the grants. The LCDC may delegate any of its functions to OCCDC, provided prior approval to any delegated action is given. The OCCDC represents the 1971 Oregon Legislature's attempt to limit changes to Oregon coastal resources. The 30 member commission from several coastal counties is charged with studying the zone's resources, to recommend their highest and best use, and develop a comprehensive coastal management plan. The OCCDC budget for 1973-75 to carry out its responsibilities exceeds $654,000. (See also W74-12756) (Schroeder-Wisconsin)
W74-12764

PLANNING FOR DIVERSITY,
Oregon Univ., Eugene. Oregon Students Public Interest Research Group.
R. Benner.
In: Coastal Zone Management Problems, seminar conducted by Water Resources Research Institute, Oregon State University, Fall 1973, Corvallis. Report SEMN WR 018-74, January 1974. p 87-90.

Descriptors: *Regional development, *Natural resources, *Coasts, *Regulation, Legislation, Management, Oregon, Zoning, Control, Comprehensive planning, Local governments, Conservation.

Oregon's former reliance upon zoning and restrictive regulations to manage land and water coastal resources have proved inadequate. Regulations implemented by a myriad of governmental jurisdictions did not provide for comprehensive consideration of the total environmental impact of any regulated activity. The effectiveness of zoning has also been limited, partially as a result of political influence and lack of a regional perspective. The recent Bill 687 was designed to protect coastal resources 'through the development and maintenance of a balance between conservation and developmental interests with respect to such resources.' The Oregon Coastal Conservation and Development Commission (OCCDC) was created to develop comprehensive plans to achieve this end. The Commission's impact on coastal resources depends upon its definition of 'balance'. Using one approach, the plan would set broad, uniform policies and leave local bodies to determine the conservation and development mix--'dispersed uniform development'. Under a second approach, a different policy would be established for each area and guidance for implementation given. Presently OCCDC is developing a single set of estuary policies which may endanger coastal resources. Undisturbed estuaries will be destroyed and total environmental degradation may be greater even though maximum damage to any individual site may be less. (See also W74-12756) (Schroeder-Wisconsin)
W74-12765

MANAGEMENT OF FISHERY RESOURCES FOR OPTIMUM RETURNS. WOULD IT WORK IN THE GULF OF MEXICO,
Rhode Island Univ., Kingston. Law of the Sea Inst.
For primary bibliographic entry see Field 6C.
W74-12766

UNCLE IS MOVING IN,
National Canners Association, Washington, D.C. Fishery Products Committee.
H. R. Robinson.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 75-80.

Descriptors: *Federal government, *Legislation, *Commercial fishing, Public health, Regulation, Fish handling facilities, Inspection, Import.
Identifiers: *Senate Bill 2824, Federal fish inspection, Insterstate commerce, Seafoods.

The impact on producers and consumers of the proposed Wholesome Fish and Fishery Products Act of 1971 is assessed. The act provides for surveillance of foreign and domestic establishments and vessels handling interstate or foreign fish or fishery products, and for the establishment of sanitation standards and quality control. The Secretary of HEW will issue certificates to those complying with the standards. The bill provides that inspectors shall have reasonable access to vessels and establishments; denial of access may be grounds to revoke certificates. The impact of the bill is multifaceted. A wide range of persons may be required to hold certificates, e.g., warehousemen, truckers, etc. Failure to meet these standards could lead to prohibition of imports of foreign fish or fishery products. Since the U.S. is dependent on such imports, such a restriction could have significant impact on consumers. Two other sections of the bill are discussed. The first provides $35 million initial capital loans to establishments, while a $40,000 loan restriction still exists. The other section discussed provides for the surveillance for dangerous materials in all foods. The Secretary of HEW will propose guidelines specifying all dangerous materials and the screening procedures to be followed. (Schroeder-Wisconsin)
W74-12769

FOOD AND DRUG ADMINISTRATION GUIDELINES FOR CONTAMINANTS IN FISHERY PRODUCTS,
Food and Drug Administration, Washington, D.C. Bureau of Foods.
For primary bibliographic entry see Field 5G.
W74-12770

ADMINISTRATION OF GROUNDWATER AS BOTH A RENEWABLE AND NONRENEWABLE RESOURCE,
Idaho Bureau of Mines and Geology, Moscow.
For primary bibliographic entry see Field 4B.
W74-12792

GUIDELINES FOR DEVELOPING OR REVISING WATER QUALITY STANDARDS, UNDER THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972.
Environmental Protection Agency, Washington, D.C. Div. of Water Planning.
For primary bibliographic entry see Field 5G.
W74-12797

WATER QUALITY STRATEGY PAPER, SECOND EDITION, A STATEMENT OF POLICY FOR IMPLEMENTING THE REQUIREMENTS OF THE 1972 FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS AND CERTAIN REQUIREMENTS OF THE 1972 MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT.
Environmental Protection Agency, Washington, D.C. Div. of Water Planning.
For primary bibliographic entry see Field 5G.
W74-12798

THE ROLE OF LAND TREATMENT OF WASTEWATER IN THE CORPS OF ENGINEERS WASTEWATER MANAGEMENT PROGRAM,
Corps of Engineers, Washington, D.C. Waste water Management Task Force.
For primary bibliographic entry see Field 5D.
W74-12897

FOREST SERVICE POLICY RELATED TO THE USE OF NATIONAL FOREST LANDS FOR DISPOSAL OF WASTEWATER AND SLUDGE,
Forest Service (USDA), Washington, D.C. Div. of Watershed Management.
For primary bibliographic entry see Field 5D.
W74-12899

SPRAY IRRIGATION--THE REGULARTORY AGENCY VIEW,
Pennsylvania Dept. of Environmental Resources, Harrisburg. Ground Water Quality Management Unit.
For primary bibliographic entry see Field 5D.
W74-12900

FEDERAL ASSISTANCE PROGRAMS FOR WATER POLLUTION CONTROL TECHNOLOGY DEVELOPMENT,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5G.
W74-12959

RESERVOIR PROJECT REAUTHORIZATION: EXAMPLES OF PAST USE AND ANALYSIS OF APPLICATION TO LAKE LANIER,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 4A.
W74-13046

POWERS OF THE STATE OF KENTUCKY IN IMPLEMENTING AN EFFLUENT TAX AS A PART OF AN INTERSTATE OHIO RIVER BASIN WATER POLLUTION CONTROL PROGRAM,
Kentucky Univ., Lexington. Water Resources Research Inst.
For primary bibliographic entry see Field 5G.
W74-13051

TOWARD A POLITICAL SCIENCE OF WATER RESOURCES DECISIONS,
Wisconsin Univ., Madison. Dept. of Political Sciences.
For primary bibliographic entry see Field 6B.
W74-13063

RECENT SOCIOLOGICAL CONTRIBUTIONS TO WATER RESOURCES MANAGEMENT AND DEVELOPMENT,
Kentucky Univ., Lexington. Center for Developmental Change.
For primary bibliographic entry see Field 6B.
W74-13064

SUMMARY OF WATER QUALITY STANDARDS FOR THE INTERSTATE WATERS OF IOWA,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-13185

INTERIM EFFLUENT GUIDANCE FOR NPDES PERMITS,
Environmental Protection Agency, Washington, D.C. Permit Program Div.
For primary bibliographic entry see Field 5G.
W74-13214

P, N:P STANDARDS FOR HAWAIIAN STREAMS,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 5B.
W74-13217

ARE THE GREAT LAKES THREATENED,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5G.
W74-13218

THE U.S.S.R.: OCEAN USE AND OCEAN LAW,
Rhode Island Univ., Kingston. Law of the Sea Inst.
M. W. Janis, and D. C. F. Daniel.
Occasional Paper No 21, Law of the Sea Institute, May, 1974. 22 p, 66 ref.

Descriptors: *International waters, *International law, *United Nations, *Military aspects, *Navigation, Ships, Transportation, Fishing, Coasts, Law of the Sea, Shores, Foreign trade, Legal aspects, Jurisdiction, Commercial fishing, Oil industry, Oceanography, Boundary disputes, Ocean beds, Political aspects, Oceans.
Identifiers: *USSR.

The Soviet Union is one of the greatest beneficiaries of the freedom of the sea. Naval strength allows use of the oceans for defensive and offensive deployments, showing of the flag around the world, and at times the exercise of gunboat diplomacy to influence smaller nations through a show of naval force. The Russian merchant marine is a major source of foreign money to control the balance of payments, and Soviet fishing efforts provide 20% of the animal protein in the Russian diet. For all the above reasons, the Soviet stance on revising the law of the sea is conservative, aimed at maintaining the status quo. Proposals to extend national jurisdication over international waters, to create a supernational agency to control the seas, or to limit the tradiational freedom of navigation and exploitation of international waters are met cautiously as representing possible serious constraints on major Soviet economic and military advantages. However, the political need to placate third world and poor nations demanding greater control over distribution of the ocean's riches dictates some flexibility in negotiation. In general, the U.S.S.R. opposes an international ocean regulatory institution or extension of national boundaries into the sea, preferring to compromise and grant some preferential fishing rights to coastal nations and international environmental protection compacts. In this way, hopefully, the Soviet exploitation of ocean resources will be impinged only to a minor degree. (Salley-Florida)
W74-13220

PROPOSITION ONE--FOR NEW YORK'S ENVIRONMENT,
For primary bibliographic entry see Field 5G.
W74-13222

ROGUE NATIONAL WILD AND SCENIC RIVER, OREGON (NOTICE OF REVISED DEVELOPMENT AND MANAGEMENT PLANS).
Bureau of Land Management, Washington, D.C.
Federal Register, Vol 37, No 131, p 13408-13415, July 7, 1972.

Descriptors: *Regulation, *Wild Rivers Act, *Rivers, *Oregon, *Adoption of practices, Land management, Land development, Federal project policy, Planning, Natural resources, Aesthetics, Scenery, Water resources, Resources development, Inter-agency cooperation, Water law, Legislation, Recreation, Land reclamation, Water utilization, Water resources development.
Identifiers: *Administrative regulations.

Notice is made of a proposed combined plan for development, operation and management of the Rogue National Wild and Scenic River to be administered by the Bureau of Land Management (BLM) and the U.S. Forest Service (FS). This single plan revises and combines the BLM and FS Master Plans for the Rogue River Component of the National Wild and Scenic Rivers system. Although the original BLM and FS Master Plans were closely coordinated, there was some differences in language which caused public confusion. The boundaries of the Rogue Wild and Scenic River and areas of responsibility for BLM and FS remain unaltered. The only substantial revision pertains to expansion of existing lodges

the stretch of river classified as Wild River. nder the original BLM Master Plan, lodge expan- on was permitted provided that BLM approved e construction and site plans. The new combined an prohibits lodge expansion. (Ritchie-Florida)
74-13227

ATIONAL POLLUTANT DISCHARGE LIMINATION SYSTEM.
vironmental Protection Agency, Washington, C.
r primary bibliographic entry see Field 5G.
74-13228

ETHODS TO EXPEDITE ENVIRONMENT OTECTION: INTERNATIONAL ECOSTAN- ARDS,
od and Agriculture Organization of the United tions, Rome (Italy).
r primary bibliographic entry see Field 5G.
74-13229

ESOLVING WATER RESOURCE RIDDLES,
nnesota Dept. of Natural Resources, St. Paul. v. of Waters, Soils and Minerals.
r primary bibliographic entry see Field 3F.
74-13230

GRICULTURAL DRAINAGE AND THE BLIC INTEREST, (PART I),
nnesota Dept. of Natural Resources, St. Paul.
r primary bibliographic entry see Field 3F.
74-13232

EW LEGAL APPROACHES TO ENVIRON- ENTAL CONTROL,
ew York State Dept. of Environmental Conser- tion, Albany.
r primary bibliographic entry see Field 5G.
74-13271

TIGATION UNDER PL 92-500: A STATUS RE- ORT,
r primary bibliographic entry see Field 5G.
74-13289

CA ENDORSES WASTE DISPOSAL PROVI- ONS.
r primary bibliographic entry see Field 5E.
74-13291

ESEARCH AND DEVELOPMENT,
ater Pollution Research Lab., Stevenage ngland).
r primary bibliographic entry see Field 5G.
74-13292

HE EUROPEAN SCENE,
nschergenossenschaft and Lippeverband, Essen /est Germany). Dept. of Chemistry.
r primary bibliographic entry see Field 5D.
74-13293

HE INSTITUTE AND EUROPE,
r primary bibliographic entry see Field 5G.
74-13294

ATER ACT 1973 RIVERS (PREVENTION OF OLLUTION) ACT 1951 ATTORNEY GENERAL WELLINGBOROUGH UDC.
r primary bibliographic entry see Field 5G.
74-13296

EETING THE NPDES DEADLINE: DOES LOSE ONLY COUNT IN HORSESHOES.
r primary bibliographic entry see Field 5G.
74-13314

6F. Nonstructural Alternatives

MAN AND WATER, THE SOCIAL SCIENCES IN MANAGEMENT OF WATER RESOURCES.
Kentucky Univ., Lexington. Water Resources Inst.
For primary bibliographic entry see Field 6B.
W74-13058

ANTHROPOLOGICAL CONTRIBUTIONS TO THE CULTURAL ECOLOGY AND MANAGEMENT OF WATER RESOURCES,
Washington Univ., Saint Louis, Mo. Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 6B.
W74-13060

ROLE OF GEOGRAPHY IN WATER RESOURCES MANAGEMENT,
Colorado Univ., Boulder. Inst. of Behavioral Science.
For primary bibliographic entry see Field 6B.
W74-13062

SPECIAL FLOOD HAZARD INFORMATION REPORT: DRY CREEK, DOUGHERTY COUNTY, GEORGIA.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W74-13067

FLOOD PLAIN INFORMATION: SOPE CREEK, VICINITY OF MARIETTA, GEORGIA.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W74-13068

FLOOD PLAIN INFORMATION, LITTLE NESHAMINY CREEK, BUCKS COUNTY, PENNSYLVANIA.
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W74-13069

SPECIAL FLOOD HAZARD INFORMATION REPORT, CHATTAHOOCHEE RIVER, ROARING BRANCH, WERACOBA CREEK AND LOWER BULL CREEK, VICINITY OF COLUMBUS, GEORGIA.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W74-13070

APPLICATION OF REMOTE SENSING TO STATE AND LOCAL GOVERNMENT (ARSIG),
Arizona Univ., Tucson. Office of Arid Lands Studies.
K. E. Foster, and J. D. Johnson.
OALS Bulletin 7, April, 1974. 81 p, 31 fig, 45 ref. NASA NGL 03-002-313.

Descriptors: *Remote sensing, Hydrology, *Stock water, *Forest management, *Floodplain zoning, Mapping, Planning future planning(Projected), Water zoning, Riparian plants, Land-use, Municipal water, Water supply, Reservoirs, Watersheds(Basins), Semiarid climates, *Arizona, Streamflow, Water loss, Evaporation, Groundwater recharge, Water yield.
Identifiers: Environmental monitoring, Stock tanks, Agricultural water.

Applications are described of remote sensing techniques using space and aircraft imagery for service-oriented programs working with local and state agencies to assist in planning, zoning, and environmental monitoring. This system is being used to study the hydrology of earth stock tanks on a semiarid watershed in north-central Arizona. These studies will determine the effect stock tanks have on streamflow, especially that critical to Phoenix municipal and agricultural water supply. The water loss by evaporation from the surfaces of the tanks is measured by specifically designed floats calibrated to determine stock tank depths. If studies show excessive loss, results could lead to regulation of construction of new tanks. Remote sensing techniques are also used to derive forest stocking equations to measure and maintain optimum forestry density for ideal natural resource production and use, especially increased water yields that rely heavily on forest management techniques. The aerial reconnaissance used in remote sensing is described and supplemented by map figures for use in determining groundwater recharge areas and the delineation of floodplain zones, information critical in land-use planning. (Michael-Arizona)
W74-13140

APPLICATION OF REMOTE SENSING TECHNIQUES IN LAND USE PLANNING: FLOODPLAIN DELINEATION,
Cochise County Planning Dept., Ariz.
For primary bibliographic entry see Field 4A.
W74-13142

YOUR LAKE INSURANCE POLICY,
9 Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters, Soils and Minerals.
M. Hambrock.
The Minnesota Volunteer, p 11-17, January-February, 1973. 3 illus.

Descriptors: *Minnesota, Water zoning, Water law, *Water policy, *Water management(Administrative), Local governments, Land use, Flood plain zoning, Water resources development, Zoning, State governments, Planning, Water management(Applied), Administrative agencies, Management, Legislation, Environmental effects, Land development, Land management.

The Minnesota Shoreland Zoning Act provides minimum state-wide criteria for the development of navigable surface waters. The Act is administered on the county level and overseen by the State Department of Natural Resources. Counties were required to specify minimum criteria for recreational development of their lakes and rivers or to adopt the state-wide criteria. Although ideally criteria would be modified for each body of water, the time constraint imposed by the Act made determination of individual criteria impractical. The state-wide plan recommends three use classifications, each with different criteria. The first class, Natural Environment Lakes and Streams, includes small lakes subject to rapid overdevelopment and eutrophication. Specially designated trout streams and rivers in the Federal wild and Scenic Rivers program are also in this class. These waters need significant protection because of their unique natural characteristics or their unsuitability for development. The second category, Recreation Development Lakes, are already moderately developed and are suited to further development and water oriented recreation. The third class, General Development Lakes and Streams, are those already heavily developed or able to withstand intense development. (Barnes-Florida)
W74-13231

6G. Ecologic Impact Of Water Development

STATE-COUNTY INTERAGENCY PROCEDURES FOR IMPOSING ENVIRONMENTAL QUALITY CONTROLS ON WATER-ORIENTED DEVELOPMENT ACTIVITIES,
Whittenburg, Vaughan Associates, Inc., Landover, Md.
For primary bibliographic entry see Field 5G.
W74-12751

DEVELOPMENT AND MANAGEMENT OF GROUNDWATER IN RELATION TO PRESERVATION OF DESERT PUPFISH IN ASH MEADOWS, SOUTHERN NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 4B.
W74-12752

THE THRESHOLD OF ENVIRONMENTAL REASON,
Corps of Engineers, Atlanta, Ga. South Atlantic Div.
G. W. Allen.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 56-61.

Descriptors: *Environment, *Protection, Pollution abatement, Social aspects, Comprehensive planning, Political aspects.
Identifiers: *Environmental quality.

The public's rising environmental sensitivity represents a turnabout from the earlier indifference. The turnabout has not been without costs, however; and these costs have generally been overlooked. First, the assessment of the environmental impact of any project is time consuming. Data collection may involve 6 months of work; analysis at least 2 more. Following the preparation of a statement, other governmental entities may review and recommend changes in the project. In addition to the assessment time a plethora of recent legislative environmental enactments have lead to confusion over the appropriate process to follow. In contrast to the extensive project data analysis, many public environmental statements are based on inadequate data, a distortion which could undermine acceptance of reliable data in the future. While not openly stated, improved environmental quality will have costs. At present the environmental picture is a 100% operation. The fault and the work always appears to lie 100% on other's shoulders. Once the realization occurs that environmental costs exist and are shared by all in varying degrees, a rational environmental quality program could emerge. Cost-payments for waste water treatment plants, decreased power supplies, etc., must be weighed against improved environmental quality to best determine the optimum quality level. (Schroeder-Wisconsin)
W74-12768

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED BYRON STATION UNITS 1 AND 2, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-12902

FINAL ELK RIVER REACTOR SITE SURVEY, RESULTS AND SUMMARY - JULY 23, 1974.
United Power Association, Elk River, Minn.
For primary bibliographic entry see Field 5B.
W74-12903

A SURVEY OF THE ANIMAL COMMUNITY OF THE MAIN POND AT CASTOR HANGLANDS NATIONAL NATURE RESERVE, NEAR PETERBOROUGH,
For primary bibliographic entry see Field 2H.
W74-12997

THE INTERAGENCY CONFERENCE ON THE ENVIRONMENT - A POST-CONFERENCE SURVEY,
California Univ., Livermore. Lawrence Livermore Lab.
G. D. Sauter, and C. F. Miller.
Available from NTIS, Springfield, Va 22161, as UCRL-51588, $3.25/copy, $2.25/microfiche. Report No UCRL-51588, June 11, 1974. 17 p.

Descriptors: *Conferences, *Symposia, *Technical societies, *Surveys, *Environment, Monitoring, Remote sensing, Model studies, Transport, Air, Water, Planning, Land use, Data collections, Data processing, Data storage and retrieval, Data transmission.

The Interagency Conference on the Environment, held at the Lawrence Livermore Laboratory in October 1972, brought together nearly 200 representatives of the U.S. Environmental Protection Agency (EPA), the Atomic Energy Commission (AEC), the National Aeronautics and Space Administration (NASA), and the various AEC and NASA laboratories. It was held to promote an effective exchange of ideas and information on environmental research and to explore ways in which the capabilities and facilities of these laboratories might be more effectively used to complement and supplement existing EPA environmental research programs. Some months after the conference, many of the participants were interviewed to determine the effectiveness and the impact of the conference. They were asked their opinions regarding the desirability and potential for establishing cooperative multi-agency environmental research programs and the barriers to such cooperation that remain to be overcome. This survey indicated that, although only a few specific research projects resulted from it, the conference was considered very successful as a medium of information exchange. Further, given some of the perceptions of 'other agency' attitudes, the current level of interagency cooperation and coordination is not likely to increase. Some guidelines for enhancing cooperation are suggested. (Houser-ORNL)
W74-13118

ENVIRONMENTAL STATUS OF THE LAKE MICHIGAN REGION, VOLUME 15. MAMMALS OF THE LAKE MICHIGAN DRAINAGE BASIN,
Wisconsin Univ., Stevens Point. Museum of Natural History.
C. A. Long.
Available from NTIS, Springfield, Va. 22161 as ANL/ES-40, Vol 15; $5.25/copy, $2.25/microfiche. Argonne National Laboratory, Report No ANL/ES-40, Vol 15, May 1974. 108 p, 35 fig, 1 tab, 66 ref.

Descriptors: *Mammals, *Surveys, *Mammal groupings, *Wildlife, Watersheds(Basins), Drainage area, *Lake Michigan, *Census, Data collections, Varieties, Aesthetics, Value, Distribution, Habitats, Sites, Nuclear powerplants, Environmental effect.

A catalog is presented of the wild mammals that inhabit the land in the drainage basin of Lake Michigan. For each species identified, data are presented on its aesthetic attributes, value, status, and distribution. A short discourse is included on the habitat preference, home range, and zoogeography of Recent mammals. This faunal account maps and documents the distribution of the mammals for planning to minimize the disruption of the natural environment by the siting of nuclear plants and other developments. The known economic values of wild animals and their aesthetic attributes are described. (Houser-ORNL)
W74-13121

ECOLOGICAL CONSIDERATIONS OF DEPLETED URANIUM MUNITIONS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 5C.
W74-13122

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED BRAIDWOOD STATION, COMMONWEALTH EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-13129

MAN'S IMPACT ON THE COLORADO RIVER IN THE GRAND CANYON,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 4C.
W74-13149

THE ENVIRONMENT AND WATER-RESOURCE DEVELOPMENT,
National Wildlife Federation, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-13221

RED BOILING SPRINGS WATERSHED PROJECT, MACON AND CLAY COUNTIES, TENNESSEE, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-13223

ALPINE LAKE PROJECT ALPINE, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.
For primary bibliographic entry see Field 4A.
W74-13224

TREXLER LAKE, JORDAN CREEK, PENNSYLVANIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W74-13225

THIMBLE SHOAL CHANNEL (MAINTENANCE DREDGING) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W74-13226

ROGUE NATIONAL WILD AND SCENIC RIVER, OREGON (NOTICE OF REVISED DEVELOPMENT AND MANAGEMENT PLANS)
Bureau of Land Management, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-13227

METHODS TO EXPEDITE ENVIRONMENT PROTECTION: INTERNATIONAL ECOSTANDARDS,
Food and Agriculture Organization of the United Nations, Rome (Italy).
For primary bibliographic entry see Field 5G.
W74-13229

THE WATER INDUSTRY IN THE DECADE OF ENVIRONMENTAL CONCERN,
Gilbert (J.B.) and Associates, Sacramento, Calif.
For primary bibliographic entry see Field 5G.
W74-13268

NEW LEGAL APPROACHES TO ENVIRONMENTAL CONTROL,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 5G.
W74-13271

ENVIRONMENTAL-IMPACT ASSESSMENT FOR PLANT DESIGN AND OPERATION,
Jones and Stokes Associates, Inc., Sacramento, Calif.
For primary bibliographic entry see Field 5G.
W74-13273

LITIGATION UNDER PL 92-500: A STATUS REPORT,
For primary bibliographic entry see Field 5G.
W74-13289

ECOLOGICAL SURVEY OF THE VENEZUELAN WESTERN LLANOS: I. THE REGIONAL ECOLOGICAL UNITS, (IN SPANISH),
Universidad de Los Andes, Merida (Venezuela). Facultad de Ciencias.
G. Sarmiento, M. Monasterio, and J. Silva.
Acta Cient Venez, Vol 22, No 2, p 52-60, 1971, Illus. English summary.
Identifiers: Vegetation, *Venezuela(Llanos), *Land classification, Landscaping.

The landscape approach to land evaluation is applied as a preliminary reconnaissance of vegetation and environment in an area of 30,000 sq km in the Venezuelan Western Llanos. The land-system methodology was adapted to the delimitation of regional units showing both morphological and genetical homogeneity. The Western Llanos form part of a sedimentary basin of levelled topography and low altitude, covered with alluvial and eolian deposits of Pleistocene and recent age. Several land forms, such as: terraces, alluvial fans, flood plains and eolian plains, resulted as a consequence of Quaternary geomorphogenetical processes. The regional climate is uniform, with a very definite alternation of humid and dry periods, the dry one lasting from 4-5 mo. The natural vegetation is grouped in 4 main types: forests, humid savannas, dry savannas, dry savannas and swamps. On a physiognomical-ecological basis a preliminary classification of each type is attempted. Seven landscapes and 31 land systems are recognized in this area.--Copyright 1973, Biological Abstracts, Inc.
W74-13355

7. RESOURCES DATA

7A. Network Design

THE ACCURACY OF RADAR-DERIVED RAINFALL MEASUREMENTS IN HILLY TERRAIN,
British Meteorological Office, Bracknell (England).
For primary bibliographic entry see Field 2B.
W74-13009

7B. Data Acquition

A VERSATILE SOIL WATER FLUX METER,
Agricultural Research Service, Madison, Wis. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2G.
W74-12837

A NEW METHOD FOR DETERMINING AND INTERPRETING DISPERSION COEFFICIENTS IN POROUS MEDIA,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 2F.
W74-12856

A REVIEW OF THE BIOCHEMICAL OXYGEN DEMAND (BOD-5) TEST,
Beak Consultants Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5A.
W74-12947

AN IMPROVED SNOW STUDY KIT,
Maine Cooperative Fishery Unit, Orono.
V. B. Richens, and C. G. Madden.
J Wildl Manage. Vol 37, No 1, p 109-113, 1973. Illus.

Descriptors: *Snow, Snow surveys, Surveys, Precipitation gages.
Identifiers: *Kit.

A modification of the National Research Council of Canada (NRC) and Cold Regions Research and Engineering Laboratory (CRREL) snow study kits was assembled due to unavailability of the former, high cost and large size of the latter, and because of specific project needs. This kit has proven satisfactory during 2 winters for measuring snow characteristics under a variety of weather conditions. It costs less than existing kits, is simply designed, is easily carried, and it may be made locally.--Copyright 1973, Biological Abstracts, Inc.
W74-12967

TRAJECTORY SENSITIVITY PROFILES IN A CLASS OF DISTRIBUTED OPTIMAL WATER QUALITY CONTROL SYSTEMS,
Newark Coll. of Engineering, Newark.
H. J. Perlis, and E. M. Duckworth, Jr.
Isa (Instrum Soc Am) Trans. Vol 12, No 1, p 62-69, 1973. Illus.

Descriptors: *Control systems, Dissolved oxygen, Aeration, Effluents.
Identifiers: Distributed, Optimal, Profiles, Sensitivity, Trajectory, State vector trajectory sensitivity.

The techniques of state vector trajectory sensitivity are extended to a class of distributed parameter environmental optimal control systems. The procedure is applied to develop the sensitivity coefficient profiles for a dynamic optimal water quality system which employs a modified Streeter and Phelps dissolved O2 model. The nominal system incorporates an optimal 2-element control vector: 1 for artificial aeration control and the other for effluent discharge control. An algorithm is presented for the simultaneous computation of the nominal system response and the sensitivity profiles. Numerical examples are presented to illustrate the method.--Copyright 1973, Biological Abstracts, Inc.
W74-12970

COMPARISON OF MEAN RAIN CATCH OF VARIOUS GAUGE NETWORKS,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wassertau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 2B.
W74-12976

REMOTE SENSING OF THE MOISTURE CONTENT OF THE ATMOSPHERE AND UNDERLYING SURFACE,
K. Ya. Kondrat'yev, V. V. Melent'yev, Yu. I. Rabinovich, and Ye. M. Shul'gina.
Soviet Hydrology, Selected Papers No 2, p 142-151, 1973. 3 fig, 1 tab, 37 ref. Translated from Water Resources (Vodnyye resursy), No 2, p 58-68, 1973.

Descriptors: *Remote sensing, *Moisture content, *Oceans, *Radio waves, Satellites(Artificial), Soil moisture, Atlantic Ocean, Pacific Ocean, Indian Ocean, Atmosphere, Microwaves.
Identifiers: *USSR, Kosmos-243 satellite.

Theoretical and experimental investigations of the radiothermal noise field of the earth-atmosphere system and the successful experiment on radiothermal measurements from Kosmos 243 showed the promise of thermal radar methods for the remote sensing of the moisture content of the atmosphere and upper soil layer. Tabulated data showed that the emissivity of the underlying soil surface decreased with increasing water content. Radiometric measurements made by the Kosmos-243 satellite showed that the average latitudinal distribution of total moisture was similar over the Pacific, Atlantic, and Indian oceans. The average water content was approximately 0.2 kg/sq m; that is, approximately 1% of the water was in the liquid droplet state. (Humphreys-ISWS)
W74-12982

ERRORS OF AERIAL SURVEY OPERATIONS AND OFFICE PROCESSING OF DATA IN AIRCRAFT MEASUREMENTS OF DISCHARGES,
For primary bibliographic entry see Field 7C.
W74-12986

AQUIFER ANALYSIS USING BACKWARD DIFFERENCE METHODS,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W74-13012

STUDY OF MEANS OF AUTOMATICALLY CLASSIFYING PLANKTON,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5A.
W74-13078

APPLICATION OF REMOTE SENSING TO STATE AND LOCAL GOVERNMENT (ARSIG),
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 6F.
W74-13140

APPLICATION OF REMOTE SENSING TECHNIQUES IN LAND USE PLANNING: FLOODPLAIN DELINEATION,
Cochise County Planning Dept., Ariz.
For primary bibliographic entry see Field 4A.
W74-13142

NATURAL RESOURCE INVENTORY FOR URBAN PLANNING UTILIZING REMOTE SENSING TECHNIQUES,
Arizona Univ., Tucson. Office of Arid Lands Studies. Office of Arid Lands Studies, Arizona Univ., Tucson.
For primary bibliographic entry see Field 6B.
W74-13143

DEVELOPMENT OF A FLOATING OIL SLICK DETECTOR.
URS Research Co., San Mateo, Calif.
For primary bibliographic entry see Field 5A.
W74-13171

AERIAL OBSERVATIONS OF SUSPENDED-SEDIMENT PLUMES IN SAN FRANCISCO BAY AND THE ADJACENT PACIFIC OCEAN,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2L.
W74-13180

A MEMBRANE FILTRATION TECHNIQUE FOR THE ENUMERATION OF ESCHERICHIA COLI IN SEAWATER,
Ministry of Agriculture, Fisheries and Food. Burnham-on-Crouch (England). Fisheries Lab.
For primary bibliographic entry see Field 5A.
W74-13237

BOD MEASURING APPARATUS,
For primary bibliographic entry see Field 5A.
W74-13242

FLUID ANALYZER WITH VARIABLE LIGHT PATH,
Gam Rad, Inc., Detroit, Mich. (assignee)
J. J. Shea.
United States Patent 3,810,695. Issued May 14, 1974. Official Gazette of the United States Patent Office, Vol 922, No 2, p 561, May 1974. 1 fig.

Descriptors: *Patents, Analyzers, *Instrumentation, Liquids, *Turbidity, Pollutant identification.
Identifiers: *Turbidimeters, *Fluid analyzers.

A turbidimeter or fluid analyzer was patented. The length of its light path is selectively variable so that different ranges of turbidity or contamination can be detected. (Prague-Firl)
W74-13252

TEMPERATURE-CONTROLLED FLUID MANIFOLD FOR A FLUID SYSTEM OF AN AUTOMATED SAMPLE ANALYZER,
Technicon Instruments Corp., Tarrytown, N.Y. (assignee)
H. G. Diebler, S. A. Gyori, and W. J. C. McCandless.
United States Patent 3,811,842. Issued May 21, 1974. Official Gazette of the United States Patent Office, Vol 922, No 3, p 856-857, May, 1974. 1 fig.

Descriptors: *Patent, *Analyzers, *Sampling, *Temperature control, Fluid movement, Automation, Analytical techniques, Chemistry, Colorimetry, Conduction.
Identifiers: *Fluid manifold, Fluid systems, Blood, Reagents.

A temperature-controlled fluid manifold for a fluid system of an automated sample analyzer was designed for analyzing a series of liquid samples flowing seriatum. The basic elements of the temperature-controlled manifold may be permanently combined with a wide variety of other components to meet the requirements of many different chemistries, each suited for analysis of a different constituent of sample, such as blood. In each individual manifold, the sample may be treated by combination and mixing with any appropriate reagent or reagents under temperature-controlled conditions for subsequent analysis such as a colorimeter. The basic manifold elements comprise a thermally conductive plate or block heated by conduction from a temperature-controlled source of heat. The plate has an outer, exposed surface of substantial area and an appropriate number of appropriately configured fluid passageway portions, such as helical mixing or helical time-delay paths. (Prague-FIRL)
W74-13258

SYSTEM FOR MONITORING AND CONTROLLING SUBSTANCES IN FLUID BODIES,
D. R. Emmons, and W. C. Beverly.
United States Patent 3,809,922. Issued May 7, 1974. Official Gazette of the United States Patent Office, Vol 922, No 1, p 338, May, 1974. 1 fig.

Descriptors: *Patents, *Chlorine, *Monitoring, *Automatic control, Temperature, Concentration, Electronic equipment, Liquids, Measurement, Water treatment.

The addition of substances, such as chlorine, to fluid bodies is controlled and the concentration of such substances is monitored by a special system. A temperature compensated probe measures the concentration, and electronic means responsive to outputs of the probe add the substance, as needed, to the desired level. (Prague-FIRL)
W74-13262

LASER LIGHT SPOTS WATER POLLUTION.
For primary bibliographic entry see Field 5A.
W74-13278

A MULTIPURPOSE SPECTROFLUORIMETER FOR THE STUDY OF NATURAL AND CONTAMINATED WATER, (IN RUSSIAN),
Akademiya Meditsinskikh Nauk SSSR.
For primary bibliographic entry see Field 5A.
W74-13358

AUTOMATIC DEVICES FOR SAMPLING SEWAGE AND SURFACE WATER, (IN RUSSIAN),
Permskii Politekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 5A.
W74-13359

HYGIENIC PROBLEMS OF AUTOMATIC MONITORING OF WATER QUALITY (BASED ON DATA OF THE WHO SEMINAR: KRAKOW: 1971), (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
For primary bibliographic entry see Field 5A.
W74-13363

A DEWPOINT HYGROMETER FOR WATER POTENTIAL MEASUREMENT,
Wescor, Inc., Logan, Utah.
E. C. Campbell, G. S. Campbell, and W. K. Barlow.
Agric Meteorol. Vol 12, No 1, p 113-121, 1973. Illus.

Descriptors: *Moisture meters, *Instrumentation, *Measurement, Dewpoint, Specific head.
Identifiers: Hygrometers.

An improved instrument for determining water potential by measuring dewpoint depression was developed. Theoretical considerations show the instrument to have a sensitivity of 0.75 micro V bar(-1) and a change in sensitivity with temperature of 0.45% C(-1). Without compensation for changes in Peltier cooling, sensitivity, and heat dissipation with temperature, errors of plus or minus 6% result from changing the temperature of the sensor between 20-50C. Performance of the instrument appears to agree well with the theory developed for the technique.--Copyright 1974, Biological Abstracts, Inc.
W74-13407

GROUND WATER LEVEL CONTROL.
German Patent 1,784,335. Issued December 13, 1973. German Patents Abstracts, Vol 6 U, No 51, p 1, January 1974.

Descriptors: Engineering structures, *Pipes, *Pumps, *Groundwater, *Water table, *Patents.

A ground water level control near a pipe trench is described which uses filter pipes and suction pipes introduced before the trench excavation and with connected suction pumps. These pipes are introduced into the ground under the bottom of the graded trench so that the filter pipes lie approximately horizontal behind each other, parallel to the trench line. Each corresponding suction pipe connected to a pump is passed sideways out of the line and projects sideways out of the ground. (Merritt-FIRL)
W74-13446

AN INEXPENSIVE SOLID-STATE AMPLIFIER FOR DETECTING MOVEMENTS AND ELECTRICAL POTENTIALS OF FISH,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5A.
W74-13482

7C. Evaluation, Processing and Publication

DISPOSAL OF HEATED WATER THROUGH GROUNDWATER SYSTEMS, VOLUME II, USER'S MANUAL NUMERICAL SIMULATION OF FLUID FLOW AND HEAT TRANSFER IN GROUNDWATER SYSTEMS,
Kansas Univ., Lawrence. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W74-12754

COMPUTER ANALYSIS OF THE PORE STRUCTURE OF ISOTROPIC POROUS MEDIA,
Agricultural Research Service, Saint Paul, Minn. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2F.
W74-12815

FIELD INVESTIGATIONS OF HEATED DISCHARGES FROM NUCLEAR POWER PLANTS ON LAKE MICHIGAN: 1972,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5B.
W74-12904

A PROCESSING SYSTEM FOR FISCHER AND PORTER PRECIPITATION GAUGE DATA,
Atmospheric Environment Service, Downsview (Ontario).
D. M. Pollock, J. Rogalsky, and D. A. Carr.
Environment Canada Publication No CLI-6-73, 1973. 17 p, 8 fig, 4 tab, append.

Descriptors: *Precipitation gages, *Data processing, *Cost analysis, Climatology, Canada, Precipitation, Computers.
Identifiers: *Fischer and Porter gauges, Ontario.

In 1970, a new system of data processing was introduced which minimized manual intervention without loss of data. In the new system, the tapes are corrected for errors in recording accumulated precipitation (not undercatch of precipitation by the gauge due to wind), and errors in timing. A step by step description of the system from the output tape from the Fischer and Porter Precipitation Gauge, through the tape translator, card punch, and computer was given. The correction logic was given for precipitation amount, time, and for the computer corrections themselves. The means of archiving the output is also given. (Jones-ISWS)
W74-12977

RAINFALL FREQUENCY VALUES FOR KENTUCKY.
Dept. of Natural Resources, Kentucky. Div. of Water.
Engineering Memorandum No 2, April 30, 1971, 37 p, 12 tab.

Descriptors: *Kentucky, *Rainfall intensity, Hydrologic data, Runoff, Rainfall, Rates, Precipitation(Atmospheric), Frequency, Flow rates, Streamflow.
Identifiers: *Rainfall frequency.

Point rainfall values were determined and tabulated for each of the 120 counties in Kentucky. Adjustments for areal and seasonal variations are not presented. Sources of information were Technical Paper 40 (Rainfall Frequency Atlas of the United States for Durations From 30 Minutes to 24 Hours and Return Periods From 1 to 100 Years) and Technical Paper 49 (Two- to Ten-Day Precipitation For Return Periods of 2 to 100 Years in the Contiguous United States), Weather Bureau, U.S. Department of Commerce. Values for runoff volumes and quick return flows are tabulated. The runoff volumes represent regionalized values derived from gaged streamsflow data and supple-

nented with climatological data and local observa-
ions. The quick return flows are those rates of
ischarge expected to persist beyond the flood
eriod as described by the 10 day principal spill-
vay hydrograph. (Humphreys-ISWS)
V74-12979

PATIAL PATTERNS OF LONG-PERIOD TREAMFLOW FLUCTUATIONS IN THE EU-ROPEAN USSR,
kademiya Nauk SSSR, Moscow. Institut Biologii
'nutrennykh Vod.
'or primary bibliographic entry see Field 2A.
V74-12981

RRORS OF AERIAL SURVEY OPERATIONS ND OFFICE PROCESSING OF DATA IN AIR-RAFT MEASUREMENTS OF DISCHARGES,
G. Shumkov.
oviet Hydrology, Selected Papers No 2, p 95-
11,1973. 7 fig, 1 tab, 6 ref. Translated from
ransactions of the State Hydrologic Institute
Trudy GGI), No 202, p 39-63, 1973.

Descriptors: *Remote sensing, *Surveys, Discharge measurement, *On-site data collec-ons, *Correlation analysis, Measurement, tatistical methods, Statistics, Discharge(Water), treamflow, Hydrologic data, Currents(Water).
dentifiers: *Aerohydrometric survey.

mathematical analysis of the effect of errors on
ie determination of discharges by the
erohydrometric method was made. Accuracy of
ischarge determinations depended significantly
n quality of aerial survey and office work, and er-
ors occurring at this stage may reach 10-15% nder unfavorable hydrometeorological condi-ons. Errors could be reduced by a factor of 1.5 - . (1) Selection of the site of airdropped range line nd assignment of the time of aerial photo surveys ith allowance for the position of the center of ravity of the model of estimated discharge made possible to reduce error in determination of ischarge due to the tilt of the aerial photographs; 2) Use of aerial method of determining wind peed and direction considerably improved mea-urement accuracy when current velocities were ow; (3) The minimum number of floats needed ust be assigned on the basis of permissible er-ors, associated with the calibration of floats. Humphreys-ISWS)
/74-12986

OMPARISONS OF MEASURED AND ESTI-IATED DAILY POTENTIAL EVAPOTRANS-IRATION IN A HUMID REGION,
gricultural Research Service, University Park,
a. Northeast Watershed Research Center.
or primary bibliographic entry see Field 2D.
/74-12988

NE-DAY EXTREME RAINFALL STATISTICS OR THE PRAIRIE PROVINCES,
tmospheric Environment Service, Downsview
Ontario).
or primary bibliographic entry see Field 2B.
/74-13000

UASI-BIENNIAL STREAMFLOW VARIATION N THE USSR,
or primary bibliographic entry see Field 2A.
/74-13011

YDROGEOLOGY OF THE POTTSVILLE ORMATION IN NORTHEASTERN OHIO,
eological Survey, Washington, D.C.
. C. Sedam.
or sale by USGS, 1200 S Eads St, Arlington, Va
2202, Price $1.75 per set. Hydrologic Investiga-ons Atlas HA-494, 1973. 2 sheets, 17 ref.

Descriptors: *Hydrogeology, *Maps, *Ohio, *Water resources, *Groundwater, Water wells, Water yield, Hydrologic data, Geologic mapping, Aquifer characteristics.
Identifiers: *Pottsville formation(Ohio).

This 2-sheet hydrologic atlas presents geologic and hydrologic data governing the occurrence of groundwater and its availability from three important sandstone aquifers in northeastern Ohio. These aquifers are the Sharon, the Connoquenessing Sandstone, and the Homewood Sandstone Members of the Pottsville Formation. The Pottsville aquifers, together with the Berea and Cussewago Sandstones, represent the most important bedrock sources of groundwater in northeastern Ohio. Groundwater is an important resource in most parts of northeastern Ohio, and is the chief source of municipal and industrial water supply in Stark, Portage, Geauga, and Wayne Counties. The aquifers of the Pottsville Formation yield more than 60 mgd or about 38 percent of the total groundwater supply in northeastern Ohio. The Sharon Member is the most productive of the three Pottsville aquifers and is the best bedrock source of water in much of northeastern Ohio. (Knapp-USGS)
W74-13015

HYDROLOGY AND WATER RESOURCES OF THE DEERFIELD RIVER BASIN, MASSACHUSETTS,
Geological Survey, Washington, D.C.
F. B. Gay, L. G. Toler, and B. P. Hansen.
For sale by USGS, 1200 S Eads St, Arlington, Va 22202, Price $1.00 per set. Hydrologic Investigations Atlas HA-506, 1974. 2 sheets, 34 ref.

Descriptors: *Water resources, *Massachusetts, *Groundwater, *Surface waters, River basins, Hydrogeology, Hydrologic data, Water quality, Water yield, Reservoirs, Alluvium.
Identifiers: *Deerfield River basin(Mass).

This 2-sheet hydrologic atlas provides information on the quantity, quality, and availability of water to aid in planning, developing, and managing water resources within the Massachusetts part of the Deerfield River basin. From its headwaters in south-central Vermont, the Deerfield River flows southward into Massachusetts, where it joins the Connecticut River at Greenfield. It drains 664 square miles, 348 square miles in Massachusetts. Drainage is in well-defined channels. The natural flow regimen of the Deerfield River has been altered by the operation of Somerset and Harriman Reservoirs in Vermont and by the operation of associated downstream hydroelectric generating stations. In Massachusetts, the river flows through the Berkshire Hills in a narrow valley bordered by steep slopes, rising to more than 1,000 feet above the river; near the Connecticut River the terrain is a flat lacustrine plain bordered by gently rolling hills. Altitudes range from 2,841 feet to 120 feet, with a mean altitude of 1,557 feet. Lakes and ponds are relatively few, only 16 being considered great ponds (more than 10 acres). Most were created or enlarged by earthen dams. The main groundwater reservoirs are in alluvial material adjacent to streams and in the Connecticut Valley lowlands near Greenfield and Deerfield. Bedrock is exposed at higher elevations or is covered with varying thicknesses of till. (Knapp-USGS)
W74-13016

PLANNING METHODOLOGY FOR THE DESIGN OF REGIONAL WASTE WATER TREATMENT SYSTEMS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W74-13018

DRAINAGE SYSTEM DESIGN AND ANALYSIS BY COMPUTER,
Soil Conservation Service, Portland, Oreg.
For primary bibliographic entry see Field 4A.
W74-13021

THE APPLICATION OF STATISTICAL TECHNIQUES TO RIVER QUALITY MANAGEMENT,
EASAMS, Camberley (England).
For primary bibliographic entry see Field 5A.
W74-13024

NONLINEAR LEAST SQUARES TECHNIQUES FOR SYSTEM IDENTIFICATION IN WATER QUALITY,
Columbia Univ., New York. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W74-13028

SEVERITY AND FREQUENCY OF DROUGHT IN MISSISSIPPI,
Mississippi State Univ., State College. Dept. of Agricultural and Biological Engineering.
For primary bibliographic entry see Field 2B.
W74-13052

SPECIAL FLOOD HAZARD INFORMATION REPORT: DRY CREEK, DOUGHERTY COUNTY, GEORGIA.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W74-13067

FLOOD PLAIN INFORMATION: SOPE CREEK, VICINITY OF MARIETTA, GEORGIA.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W74-13068

FLOOD PLAIN INFORMATION, LITTLE NESHAMINY CREEK, BUCKS COUNTY, PENNSYLVANIA.
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W74-13069

SPECIAL FLOOD HAZARD INFORMATION REPORT, CHATTAHOOCHEE RIVER, ROARING BRANCH, WERACOBA CREEK AND LOWER BULL CREEK, VICINITY OF COLUMBUS, GEORGIA.
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 4A.
W74-13070

ARIZONA CLIMATE, 1931-1972.
For primary bibliographic entry see Field 2B.
W74-13139

FORECASTING YIELD OF WHEAT AND BARLEY FROM METEOROLOGICAL FACTORS IN RAIN-FED AREAS OF IRAQ,
Institute for Applied Research on Natural Resources, Baghdad (Iraq).
For primary bibliographic entry see Field 3F.
W74-13154

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 4. HYDROGRAPH ANALYSIS,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
For primary bibliographic entry see Field 2E.
W74-13177

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES,
National Oceanic and Atmospheric Administration, Rockville, Md.

For primary bibliographic entry see Field 2H.
W74-13178

FLOODS OF JUNE 1972 IN THE HARRISBURG AREA, PENNSYLVANIA,
Geological Survey, Washington, D.C.
L. V. Page, and L. C. Shaw.
For sale by USGS, 1200 S. Eads St., Arlington, Va 22202, Price $1.00. Hydrologic Investigations Atlas HA-530, 1973. 1 sheet, 3 fig, 1 map, 1 tab, 5 ref.

Descriptors: *Floods, *Pennsylvania, *Maps, Flood data, Flood profiles, Flood frequency, Flood recurrence interval, Stage-discharge relations, Historic floods, Hurricanes.
Identifiers: *Harrisburg(Pa).

This hydrologic atlas presents information on the frequency, depth, and extent of flooding along a 20-mile reach of the Susquehanna River extending from Marysville, Pa., to Falmouth, Pa., and including the Harrisburg area. The approximate area inundated by the flood resulting from tropical storm Agnes in June 1972 is shown on a topographic base map. The purpose is to provide a technical basis from which sound decisions can be made concerning the use of flood-plain lands. The areal extent of flooding is mapped for the largest known flood, which occurred on June 24, 1972, Frequency of flooding on the Susquehanna River was determined from the records of annual peak discharge data for the Nagle Street gaging station at Harrisburg. (Knapp-USGS)
W74-13186

FLOOD OF MARCH 1968 ON THE NEPONSET RIVER, MASSACHUSETTS,
Geological Survey, Washington, D.C.
L. A. Swallow, and G. K. Wood.
For sale by USGS, 1200 S. Eads St. Arlington, Va 22202, Price 75 cents. Hydrologic Investigations Atlas HA-500, 1973. 1 sheet, 4 fig, 1 map, 5 ref.

Descriptors: *Floods, *Maps, *Massachusetts, Flood frequency, Flood recurrence interval, Flood profiles, Flood data, Hydrologic data, Stage-discharge relations.
Identifiers: *Neponset River(Mass), *Boston(Mass).

This 1-sheet hydrologic atlas shows on a photomosaic base the extent of flooding along the Neponset River between Walpole and Milton Lower Mills, Mass., during the flood of March 1968. It also presents flood data for two gaging stations, two crest-stage stations, and a selected downstream site in the Neponset River basin. The report illustrates the magnitude of the March 1968 flood and can guide decisions pertaining to flood-plain use and to flood containment and prevention. The flood of March 1968 on the Neponset River was caused by an intense 3-day storm, which began on March 17. In a 36-hour period, rain, totaling from 5 to 7 inches, fell on ground already saturated by snowmelt and by heavy rain on March 12-13. For the periods of record at the two gaging stations--Neponset River at Norwood and East Branch Neponset River at Canton--maximum discharge of this flood was exceeded only by the flood of August 1955. (Knapp-USGS)
W74-13187

FLOODS IN CAPRON QUADRANGLE, NORTHEASTERN ILLINOIS,
Geological Survey, Washington, D.C.
R. S. Grant, and M. D. Duerk.

Descriptors: *Floods, *Illinois, *Maps, Flood data, Flood profiles, Flood frequency, Flood recurrence interval, Flood plains, Hydrologic data.
Identifiers: *Capron(Ill).

This 1-sheet hydrologic atlas presents hydrologic data that can be used to evaluate the extent, depth, and frequency of flooding that affect economic development of flood plains in the Capron quadrangle, northeastern Illinois. It can aid individuals, government agencies, and others responsible for solving existing flood problems and for formulating effective flood-plain regulations that will minimize the creation of new flood problems. The report can also be useful for preparing building and zoning regulations, locating waste disposal facilities, developing recreational areas, and managing surface water in relation to the groundwater resources. The areas inundated by floods along streams in the Capron quadrangle are shown on a topographic map. Greater floods than those whose boundaries are shown on the map are possible. The flood boundaries shown provide a record of historic fact that reflects channel conditions existing when the floods occurred. (Knapp-USGS)
W74-13188

FLOODS IN GARDEN PRAIRIE QUADRANGLE, NORTHEASTERN ILLINOIS,
Geological Survey, Washington, D.C.
R. T. Mycyk, and R. S. Grant.
For sale by USGS, 1200 S. Eads St., Arlington, Va 22202, Price 75 cents. Hydrologic Investigations Atlas HA-497, 1973. 1 sheet, 10 fig, 1 tab, 2 ref.

Descriptors: *Floods, *Illinois, *Maps, Flood profiles, Flood data, Flood frequency, Flood recurrency interval, Stage-discharge relations, Hydrologic data.
Identifiers: *Garden Prairie(Ill).

This 1-sheet hydrologic atlas presents hydrologic data that can be used to evaluate the extent, depth, and frequency of flooding that affect the economic development of flood plains in the Garden Prairie quadrangle, Northeastern Illinois. It will aid individuals, government agencies, and others responsible for solving existing flood problems and for formulating effective flood-plain regulations that will minimize the creation of new flood problems. The report will also be useful for preparing building and zoning regulations, locating waste disposal facilities, developing recreational areas, and managing surface water in relation to the groundwater resources. The areas inundated by floods along streams in the Garden Prairie quadrangle are delineated on a topographic map. Greater floods than those whose boundaries are shown on the map are possible. The flood boundaries shown provide a record of historic fact that reflect channel conditions existing when the floods occurred. (Knapp-USGS)
W74-13189

FLOODS IN HARVARD QUADRANGLE, NORTHEASTERN ILLINOIS,
Geological Survey, Washington, D.C.
H. E. Allen, and A. W. Noehre.
For sale by USGS, 1200 S. Eads St., Arlington, Va 22202, Price 75 cents. Hydrologic Investigations Atlas HA-496, 1973. 1 sheet, 11 fig, 3 ref.

Descriptors: *Floods, *Illinois, *Maps, Flood data, Flood frequency, Flood profiles, Flood recurrence interval, Hydrologic data.
Identifiers: *Harvard(Ill).

This 1-sheet hydrologic atlas presents data that can be used to evaluate the extent, depth, and frequency of flooding that affect the economic development of flood plains in the Harvard quadrangle, northeastern Illinois. It will aid individuals, government agencies, and others responsible for solving existing flood problems and for formulating effective flood-plain regulations. The report will also be useful for preparing building and zoning regulations, locating waste disposal facilities, developing recreational areas, and managing surface water in relation to the groundwater resources. The areas inundated by floods along streams in the Harvard quadrangle are delineated on a topographic map. (Knapp-USGS)
W74-13190

WATER RESOURCES OF THE MAUMEE RIVER BASIN, NORTHEASTERN INDIANA,
Geological Survey, Washington, D.C.
R. A. Pettijohn, and L. G. Davis.
For sale by USGS, 1200 S. Eads St, Arlington, Va 22202, Price $1.00 per set. Hydrologic Investigations Atlas HA-493, 1973. 3 sheets, 24 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater, *Maps, *Indiana, River basins, Water quality, Water balance, Alluvium, Water supply, Hydrogeology, Streamflow, Hydrologic data.
Identifiers: *Maumee River basin(Ind).

This 3-sheet hydrologic atlas presents general information on streamflow characteristics, groundwater availability, and quality of water in the Indiana part of the Maumee-basin. The emphasis is on the regional rather than the specific approach to the basin's water resources. Therefore, the information should be used for regional planning and not for design purposes. The Maumee River and its tributaries drain 6,608 square miles, of which 1,283 square miles are in northeast Indiana. The St. Joseph River flows south out of Michigan and the St. Marys River northwest out of Ohio. The two rivers join at Fort Wayne, Indiana, to form the Maumee River, which flows northeast through Ohio to Lake Erie. (Knapp-USGS)
W74-13191

GROUND-WATER FAVORABILITY AND SURFICIAL GEOLOGY OF PARTS OF THE MEDXNEKEAG RIVER AND PRESTILE STREAM BASINS, MAINE,
Geological Survey, Washington, D.C.
G. C. Prescott, Jr.
For Sale by USGS, 1200 S. Eads St, Arlington, Va 22202, Price $1.00. Hydrologic Investigations Atlas HA-486, 1973. 1 sheet, 1 map, 1 tab, 9 ref.

Descriptors: *Water resources, *Maps, *Hydrogeology, *Geologic mapping, *Maine, Water yield, Aquifer characteristics, Water wells, Hydrologic data, Water quality, Groundwater.
Identifiers: *Meduxnekeag River(Maine).

This 1-sheet hydrologic atlas describes briefly the geologic and hydrologic conditions governing the occurrence of groundwater in an area of about 312 square miles in the drainage basins of Meduxnekeag River and Prestile Stream in Aroostook County, northern Maine. The index map shows the area of this report, areas for which reports have been published, and areas where groundwater studies are in progress. The yields that might be expected from properly located and constructed wells of 6 inches or more in diameter in unconsolidated deposits are indicated by the map showing groundwater favorability and surficial geology. This map gives a generalized interpretation of observed geologic and hydrologic data. It provides a logical base for directing detailed exploration for groundwater but does not eliminate the need for such exploration. The yields of 138 wells range from 1 quart per minute to 400 gpm. The average yield is 24 gpm and the median is 8 gpm. The outcrop area for the various formations is shown on the generalized bedrock geologic map. The groundwater in the area is generally of good quality but the water is moderately hard to very hard. (Knapp-USGS)
W74-13192

GROUND-WATER FAVORABILITY AND SURFICIAL GEOLOGY OF THE LOWER ST. JOHN RIVER VALLEY, MAINE,
Geological Survey, Washington, D.C.
G. C. Prescott, Jr.

For sale by USGS, 1200 S. Eads St, Arlington, Va 22202, Price 75 cents. Hydrologic Investigations Atlas HA-485, 1973. 1 sheet, 1 map, 1 tab, 10 ref.

Descriptors: *Water resources, *Groundwater, *Maps, *Maine, Geologic mapping, Hydrogeology, Water yield, Aquifer characteristics, Water balance, Water quality, Hydrologic data.
Identifiers: *St. John River(Maine).

This 1-sheet hydrologic atlas describes the geologic and hydrologic conditions governing the occurrence of groundwater in the lower St. John River Valley, Maine. The purpose is to provide information that would be useful to those doing resource planning or to those interested in developing water supplies, particularly supplies large enough for public, industrial, or commercial use, from groundwater sources. The magnitude of yields that might be expected from properly located and constructed wells of 6 inches or more in diameter is indicated by the map showing groundwater favorability areas and surficial geology. The quality of the groundwater in the area is good and the water is generally suitable for most purposes. It is in the moderately hard to hard range, the water in bedrock being somewhat harder and more highly mineralized than water in unconsolidated aquifers. Surface water is softer and less highly mineralized than groundwater. (Knapp-USGS)
W74-13193

FLOOD OF MARCH 1968 ON THE IPSWICH RIVER, MASSACHUSETTS,
Geological Survey, Washington, D.C.
L. A. Swallow, and D. J. Fogarty.
For sale by USGS, 1200 S. Eads St, Arlington, Va 22202, Price $1.00 per set. Hydrologic Investigations Atlas HA-482, 1973. 2 sheets, 5 fig, 4 map, 4 ref.

Descriptors: *Floods, *Maps, *Massachusetts, Flood data, Flood frequency, Flood profiles, Flood recurrence interval, Hydrologic data, Stage-discharge relations.
Identifiers: *Ipswich River(Mass).

This 2-sheet hydrologic atlas presents photomosaics which show areas inundated along the Ipswich River, Massachusetts, during the flood of March 1968, and flood data for the gaging stations in the Ipswich River basin. The report illustrates the magnitude of the March 1968 flood and provides a technical basis for making decisions pertaining to flood-plain use and to flood containment and prevention. The flood of March 1968 on the Ipswich River caused by intense rainfall, which began on March 17. In northeastern Massachusetts, from 4 to 5 inches of rain fell on ground already saturated by snowmelt and heavy rain which had fallen on March 12-13. The resulting flood was the highest for the period of record at the three gaging stations in the Ipswich River basin. At the gaging station near Ipswich, historical data indicate that the flood of March 1968 was the greatest since the flood of 1886. The Ipswich River is a coastal stream which meanders through swamps and meadows along much of its course. Flood damage is caused by inundation rather than by high velocity. Because most of the flood plain along the river is undeveloped, flood damage in March 1968 was not great--confined mostly to the basements of homes. (Knapp-USGS)
W74-13194

FLOOD SURVEYS ALONG TAPS ROUTE, ALASKA,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 2E.
W74-13198

GROUND-WATER CONDITIONS IN THE LOWER HASSAYAMPA AREA, MARICOPA COUNTY, ARIZONA,
Geological Survey, Phoenix, Ariz.
For primary bibliographic entry see Field 4B.
W74-13209

ESTIMATING SOLAR RADIATION ON MOUNTAIN SLOPES,
Forest Service, (USDA), Franklin, N.C. Southeastern Forest Experiment Station.
For primary bibliographic entry see Field 2D.
W74-13415

A MATHEMATICAL EXAMINATION OF URBAN RUN-OFF PREDICTION,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 4C.
W74-13449

8. ENGINEERING WORKS

8A. Structures

RED BOILING SPRINGS WATERSHED PROJECT, MACON AND CLAY COUNTIES, TENNESSEE, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 4A.
W74-13223

ALPINE LAKE PROJECT ALPINE, TEXAS, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.
For primary bibliographic entry see Field 4A.
W74-13224

TREXLER LAKE, JORDAN CREEK, PENNSYLVANIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 4A.
W74-13225

SOME INVESTIGATIONS CONCERNING UPVC WATER AND SEWER PIPES AND FITTINGS,
Vattenbyggnadsbyran Ltd., Stockholm (Sweden).
L.-E. Janson, and P. Valimaa.
Journal of the American Water Works Association, Vol 66, No 6, p 360-368, June, 1974. 18 fig, 10 ref.

Descriptors: *Pipes, Construction materials, Pressure conduits, *Sewers, *Testing, Performance.
Identifiers: Fittings, *Finland, *UPVC pipes.

Developmental work conducted in Finland on long-term behavior of pipes and fittings as a function of raw material properties and manufacturing techniques is discussed. Results show that the raw material properties for UPVC pipes are far more important for the long-term strength than has been recognized in most international standards. As for pressure pipes, the permissible tensile stress can easily be raised if proper requirements of the raw material are formulated and an adequate testing method is introduced. Even for sewer pipes the raw-material properties are of great importance for the long-term behavior of the total installation. (Sandoski-FIRL)
W74-13313

UNIVERSAL BASIN FOR USE IN A SEWER SYSTEM,
J. M. Johannessen.
United States Patent 3,815,748. Issued June 11, 1974. Official Gazette of the United States Patent Office, Vol 923, No 2, p 549, June 11, 1974. 1 fig.

Descriptors: *Patents, Equipment, *Sewers, *Basins, Flow.
Identifiers: *Sewer systems.

A patent was issued for a basin to be used in a sewer system. The equipment has a draining device designed as a cover and consists of a housing with a submerged inlet opening and a centrally located outlet opening. The housing contains an outlet chamber with a circular or helical sidewall. An inlet tube opens tangentially along this sidewall into the outlet chamber. When the water level in the basin rises, the water flowing into the outlet chamber circulates so that it works as a centrifugal brake and retards the water flow. (Prague-FIRL)
W74-13335

TARGET SYSTEM FOR LAYING SEWER PIPES,
Laser Alignment, Inc., Grand Rapids, Mich. (assignee).
R. J. Roodvoets, and J. Stapert, Jr.
United States Patent 3,815,250. Issued June 11, 1974. Official Gazette of the United States Patent Office, Vol 923, No 2, p 419, June 11, 1974. 1 fig.

Descriptors: *Patents, *Sewers, Pipes, Installation, Equipment.
Identifiers: *Sewer pipes, *Lasers.

An adjustable target is described which has use in aligning pipes with a laser beam or an other similar collimated light beam which is projected axially with the pipe. The target has a base member, a level carried by the base member, and an upright target carried by an vertically adjusted relative to the base. Extension means for the base member extend the base laterally to permit the target to be employed in larger pipes. (Prague-FIRL)
W74-13337

EXPERIENCES WITH BUTTERFLY VALVES,
Kansas City, Mo. Div. of Water Supply.
J. R. Popalisky.
Journal of the American Water Works Association, Vol 66, No 6, p 349-351, June, 1974. 4 fig, 1 tab.

Descriptors: *Butterfly valves, *Water treatment, Equipment, Water supply, *Missouri.
Identifiers: *Raw-water pump discharge-and-distributions-control system.

The use of rubber-seated butterfly valves is elucidated. The valves are employed in low-pressure applications at a water treatment facility in Kansas City, Missouri. Experience with these valves has been generally favorable except for 30 in a group of 32 associated with a raw-water pump discharge-and-distributions-control system for a treatment facility. The valves had gum-rubber seats and stainless-steel disc edges. The isolated seat failures were attributed to the substitution of inferior rubber compounding material and the use of the seats in a non-disinfected raw-water environment. (Leibowitz-FIRL)
W74-13338

COMPUTERIZED REPORTS IMPROVE SEWER MAINTENANCE,
For primary bibliographic entry see Field 5G.
W74-13339

DOUBLE-BOTTOM BARGES PROVIDE GREATER PROTECTION AGAINST WATER POLLUTION.
For primary bibliographic entry see Field 5G.
W74-13437

GIGANTIC PIPE RESCUES A TOWN FROM FLOODING.
Excavating Contractor, Vol 68, No 4, p 20-21, April, 1974.

Descriptors: *Floodproofing, *Concrete pipes, Floodplains, Pipes, Rural areas, Storm drains, Storm runoff, Cities, Costs, Control structures, Drainage engineering, *Michigan.

Identifiers: *Land runoff, *Henry-Graham Storm Drain, Pre-cast concrete, Detroit(Mich).

As rural areas are developed and land runoff becomes a problem, large diameter pipes may provide a viable solution. In the suburbs of Detroit, a former flood plain which is now residential was previously perennially flooded. To relieve this problem, the Henry-Graham Storm Drain was constructed. This is a mile-long segment of steel-reinforced pre-cast concrete pipe, 17 feet in diameter. Its design outlet capacity is 2000 cu ft per second. This pipe successfully carries incredible water capacities and allows the entire system to be effective, preventing flooding. (Prague-FIRL)
W74-13447

8B. Hydraulics

FUNDAMENTALS OF TRANSPORT PHENOMENA IN POROUS MEDIA.
International Association for Hydraulic Research, Delft (Netherlands); and International Society of Soil Science, Amsterdam (Netherlands).
For primary bibliographic entry see Field 2F.
W74-12811

PORE STRUCTURE AND FLOW PROPERTIES OF POROUS MEDIA,
Purdue Univ., Lafayette, Ind. School of Chemical Engineering.
For primary bibliographic entry see Field 2F.
W74-12814

JUMP CONDITIONS IN THE HYDRODYNAMICS OF POROUS MEDIA,
Agricultural Research Service, Madison, Wis. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 2F.
W74-12821

FLOW OF WATER THROUGH POROUS MEDIA AT LOW SHEAR RATES,
New South Wales Univ., Kensington (Australia). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W74-12830

APPLICATION OF BOUNDARY-LAYER THEORY TO DISPERSION IN WELL-MIXED ESTUARIES,
Nielsen Engineering and Research, Inc., Mountain View, Calif.
For primary bibliographic entry see Field 5B.
W74-12858

BUOYANT FORCED-PLUMES IN CROSS FLOW,
McGill Univ., Montreal (Quebec). Dept. of Civil Engineering and Applied Mechanics.
V. H. Chu, and M. B. Goldberg.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY9, Proceedings Paper 10805, p 1203-1214, September 1974. 5 fig, 10 ref, 2 append. National Research Council of Canada Grant A7922.

Descriptors: *Entrainment, *Jets, *Mixing, *Buoyancy, Laboratory tests, Density, Turbulence, Momentum equation, Viscosity, Vortices.
Identifiers: Near field, Far field, *Cross flow.

Buoyant forced-plumes in a neutrally stable cross flow were simulated in a laboratory flume. Saline solution was injected into the stream of freshwater to study the combined effects of exit-momentum flux and buoyancy. A simple theory based on dimensional argument and on the entrainment concept is proposed. The entrainment coefficient remains essentially constant (approx. 0.5) along the plume, independent of local density differences. An equation was developed to determine the downstream location of the transition from near field flow which depends on jet exit momentum flux to far field flow which depends primarily on buoyancy. (Adams-ISWS)
W74-12978

STORM SURGES IN THE BAY OF BENGAL,
Meteorological Office, New Delhi (India).
For primary bibliographic entry see Field 2L.
W74-12985

SWIRLING SHALLOW SUBMERGED TURBULENT PLUMES,
Colorado Univ., Boulder. Dept. of Aerospace Engineering Science.
For primary bibliographic entry see Field 5B.
W74-12989

SURFACE SHEAR WAVES,
Bristol Univ. (England). School of Mathematics.
D. H. Peregrine.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY9, Proceedings Paper 10809, p 1215-1227, September 1974. 7 fig, 15 ref, 3 append. Army Contract DA-31-124-ARO-D-462.

Descriptors: *Beaches, *Hydraulics, *Waves(Water), *Mathematical models, *Sluices, *Mathematics, Hydraulic jump, Rotational flow, Weirs, Viscous flow, Streams, Sands, Dunes.
Identifiers: *Fluid flow, *Backwash from surf, *Surface shear waves, Wave hydraulic jump, Antidunes, Turbulent jet.

Two examples of steep very large amplitude waves were described. One occurs on flows below weirs or sluices and is known as the wave hydraulic jump. A mathematical analysis was presented to describe its main features. This mathematical model also partially explains the first approximation of the flow of a supercritical stream which is forced by an obstacle to separate from its bed and flow over an eddy. The other example is a stationary form of surface wave, that can be observed in backwash from surf on a beach. It was suggested that these waves are formed by flow over a separation eddy. This hypothesis which was proposed as valid for these latter waves served to link them with the wave hydraulic jump. The general name 'surface shear waves' was proposed for both wave types since their steep rounded crests could be explained by a thin fast surface layer of water. (Bhowmik-ISWS)
W74-12994

THE DEVELOPMENT FROM TWO-DIMENSIONAL TO THREE-DIMENSIONAL TURBULENCE GENERATED BY BREAKING WAVES,
State Univ. of New York, Albany. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 2H.
W74-12996

SOME EXPERIMENTAL OBSERVATIONS OF UPSTREAM DISTURBANCES IN A TWO-FLUID SYSTEM,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science; and Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
R. R. Long.
Tellus, Vol 26, No 3, p 313-317, 1974. 4 fig, 5 ref. Contract N00014-67-A-0163-0013.

Descriptors: *Stratified flow, *Channel flow, *Hydraulic jump, *Atmosphere, Energy loss, Theoretical analysis, Upstream, Flow, Channels, Waves(Water).
Identifiers: *Experimental observations, *Obstacle crest, *Fluid flow, Hydraulic drop.

Some experimental measurements of flow of two fluids over an obstacle in a channel were reported. Comparisons were made between theoretical predictions of upstream disturbances and measurements of the height and speed of the upstream jump and the depth of the lower fluid over the obstacle crest. The results indicated good quantitative agreement between theory and observations when the lower fluid has a depth less than that of the upper fluid. However, when the lower fluid was deeper than the upper fluid, the predicted upstream disturbance did not occur. (Bhowmik-ISWS)
W74-13003

STANDING WAVES ON BEACHES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2L.
W74-13006

DETERMINISM AND STOCHASTICITY IN HYDROLOGY,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W74-13010

DRAINAGE SYSTEM DESIGN AND ANALYSIS BY COMPUTER,
Soil Conservation Service, Portland, Oreg.
For primary bibliographic entry see Field 4A.
W74-13021

OPTIMIZED DESIGN OF A SUBSURFACE DRAINAGE SYSTEM,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W74-13025

UNIT STREAM POWER FOR SEDIMENT TRANSPORT IN NATURAL WATERS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2J.
W74-13049

HYDROLOGIC ENGINEERING METHODS FOR WATER RESOURCES DEVELOPMENT: VOLUME 4. HYDROGRAPH ANALYSIS,
Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
For primary bibliographic entry see Field 2E.
W74-13177

DESIGN, DRILLING AND COMPLETION, OPERATION, AND COST OF UNDERGROUND WASTE DISPOSAL WELLS IN GULF COAST REGION OF TEXAS AND LOUISIANA,
Pollution Control and Waste Disposal, Inc., New Orleans, La.
For primary bibliographic entry see Field 5B.
W74-13340

A CONTINUUM MECHANICAL APPROACH TO THE FLOW EQUATIONS FOR MEMBRANE TRANSPORT: I. WATER FLOW,
Meharry Medical Coll., Nashville, Tenn. Div. of Biophysics and Neurobiology.
For primary bibliographic entry see Field 2E.
W74-13367

8C. Hydraulic Machinery

FUEL SEDIMENT BOWL ASSEMBLY,
Deere and Co., Moline, Ill. (assignee)
For primary bibliographic entry see Field 5D.
W74-13245

GROUND WATER FOR THE OIL INDUSTRY IN TEXAS AND SOUTHEAST NEW MEXICO,
For primary bibliographic entry see Field 4B.
W74-13343

SEWAGE AERATOR - WITH SUBMERGED MOTOR CARRIED BY FLOATS.
For primary bibliographic entry see Field 5D.
W74-13443

8D. Soil Mechanics

THE SEALING MECHANISM OF WASTE-WATER PONDS,
California Univ., Riverside. Dept. of Soil Science and Agriculture.
For primary bibliographic entry see Field 5D.
W74-13299

8E. Rock Mechanics and Geology

ROCK MECHANICS PROPERTIES OF TYPICAL FOUNDATION ROCK TYPES: SUMMARIZING PHYSICAL AND MECHANICAL TESTS OF ROCK SAMPLES FROM SEVERAL TYPES OF FOUNDATION SITES,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
J. R. Brandon.
Report REC-ERC-74-74-10, July 1974. 99 p, 3 fig, 3 tab.

Descriptors: *Rock properties, *Foundation rocks, *Rock mechanics, *Data collections, Elasticity(Mechanical), Dams, Mechanical properties, Physical properties, Shear strength, Strength.

Tests of physical and mechanical properties of representative rock core samples from several U.S. Bureau of Reclamation project foundation sites are summarized in rock data sheets. The summary includes location, geologic occurrence, and a petrographic description of the rock types. Properties listed include: absorption; specific gravity; secant elastic modulus; compressive strength; tensile strength; and shear strength, including cohesion and coefficient of angle of internal friction. The work covers 43 typical rock types from sites of dams, powerplants, tunnels, and other Bureau structures. (Knapp-USGS)
W74-13211

GROUND WATER FOR THE OIL INDUSTRY IN TEXAS AND SOUTHEAST NEW MEXICO,
For primary bibliographic entry see Field 4B.
W74-13343

8G. Materials

ICEBREAKING BY TOW ON THE MISSISSIPPI RIVER,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 2C.
W74-13170

8H. Rapid Excavation

KRA CANAL PROJECT: A PRELIMINARY ASSESSMENT OF NUCLEAR EXCAVATION FEASIBILITY FOR ROUTE 5A,
California Univ., Livermore. Lawrence Livermore Lab.
J. Toman, H. Tewes, K. Peterson, D. Emerson, and D. Montan.
Available from NTIS, Springfield, Va. 22161 as UCRL-51418; $3.25/copy, $2.25/microfiche. Report No UCRL-51418, June 1974. 22 p, 11 fig, 7 tab.

Descriptors: *Nuclear explosions, Nuclear engineering, Construction, Craters, *Canals, *Channels, *Surveys, Environmental effects, *Feasibility studies, Economics, Cost-benefit analysis, Assessment, Safety, Evaluation, Comparative benefits, Comparative costs.
Identifiers: *Thailand(Isthmus of Kra).

A preliminary survey of the possibility of excavating a portion of a canal across the Isthmus of Kra with nuclear explosives has been completed. For the proposed route (designated 5A), a conservative approach has been used to determine 'upper limit' values for potential adverse effects resulting from the nuclear and conventional construction phases of the project. This survey does not claim to be a detailed design, nor, indeed, a feasibility study. Emphasis has been on evaluating those issues which might rule out the possibility of nuclear excavation at this stage, and on providing a basis for comparing the safety, operational, and economic factors of the nuclear option with those of conventional excavation. Within the limitations of the study, it has been concluded that there are no technical, safety, or operational factors which would preclude the successful implementation of this project. (Houser-ORNL)
W74-13119

A SELECTED, ANNOTATED BIBLIOGRAPHY OF THE CIVIL, INDUSTRIAL, AND SCIENTIFIC USES FOR NUCLEAR EXPLOSIONS.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 5C.
W74-13133

8I. Fisheries Engineering

FISH POISONING IN THE EASTERN CARIBBEAN,
Caribbean Research Inst., St. Thomas, Virgin Islands.
For primary bibliographic entry see Field 5C.
W74-12772

THE DESIGN OF AN AQUACULTURE ENTERPRISE,
Foods MultiNational, Inc., Groton, Mass.
H. H. Webber.
In: Proceedings of the 24th Annual Session Gulf and Caribbean Fisheries Institute, November 1971, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Coral Gables, Florida, p 117-125.

Descriptors: *Design criteria, *Aquiculture, *Sites, Desicion making, Economic evaluation, Fish management, Social aspects, Institutional constraints, Legal aspects, Political aspects, Fish farming, Limiting factors, Heated water.
Identifiers: Range fish management, Static pond aquafarming, Raceway fish culture, Cage fish culture, Basket fish culture.

Factors to be considered in choosing the optimum aquaculture management approach are discussed. Under a ranch management approach, Natural embayments are treated like the open ranges of the early west. Choice of this approach depends on the embayment's ecological suitability as well as its legal and social availability. This approach tends to be labor intensive and shares the high costs of any 'cattle round-up.' A second approach, the static pond method, requires adequate knowledge about the soil and water supply conditions because of the tremendous amount of earthwork and water required for such ponds. Rations must be provided to ensure an optimal yield. A closed high density culture approach employing a closed water recycling mechanism is also explored; under this approach the firm is less sensitive to outside pollutants although it requires sizable capital investment. Two other approaches: a race culture method utilizing flowing water and a cage approach which confines animals suspended in large water bodies or raceways are explored. In raceways complete ration must be provided. A checklist of aquaculture site selection criteria covering ecological, economic, political, legal, and social parameters is also presented. (Schroeder-Wisconsin)
W74-12773

THE LOBSTER FISHING INDUSTRY OF MT. PLEASANT, BEQUIA ISLAND, WEST INDIES,
Minnesota Univ., Duluth. Dept. of Geography.
For primary bibliographic entry see Field 6C.
W74-12774

CONSTRUCTION AND REHABILITATION OF COMMERCIAL OYSTER REEFS IN FLORIDA FROM 1949 THROUGH 1971 WITH EMPHASIS ON ECONOMIC IMPACT IN FRANKLIN COUNTY,
Florida Dept. of Natural Resources, St. Petersburg. Marine Research Lab.
W. K. Whitfield, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11280, $3.75 in paper copy, $2.25 in microfiche. Special Scientific Report No 38, April 1973. 42 p, 36 fig, 6 tab, 22 ref.

Descriptors: *Marine fisheries, *Oysters, *Economic impact, Commercial fisheries, Management, Florida, Cost analysis.

In 1949, the Florida Department of Natural Resources began rehabilitating depleted natural oyster bars and constructing new beds. Since then, over 4.2 million bushels of oyster shells and other cultch material have been planted in 10 Florida counties including 1.9 million bushels planted in three counties during 1967-71. Recently planted reefs comprise 12% of local reef acreage used by oystermen. Areas selected for reef construction and rehabilitation were chosen according to water quality, hydrography, physiography and biological considerations. Cultch was planted by blowing shells off both sides of a stationary barge utilizing a high pressure water stream. Oyster beds planted in Florida may be harvested around the edges 18 months after construction and will reach full commercial productivity in 24-30 months. Planting costs were approximately 9.5 cents/bushel of cultch material. Unamortized planting expenditures are estimated to be less than 1% of the estimated value of the oysters expected to be harvested from the planted reefs over a 20 year period. The economic impact of the oyster harvest on Bay, Brevard and Franklin Counties is described. (Schroeder-Wisconsin)
W74-12776

THE SIGNIFICANCE OF SUMP-PONDS IN HARVESTING PADDY-FIELD FISHES IN NORTH KRIAN, PERAK.
Universiti Sains Malaysia. Penang. Pusat Pengajian Sains Kajihayat.
Tan Soon Peng.
Malay Nat J. 26(1/2): 26-31. Illus. 1973. (In Engl.).

Descriptors: Fish, Sumps, Endrin, Pesticides, *Fish management, Fisheries, Fish farming.
Identifiers: Anabas-testudineus, BHC, Clarias-macrocephalus, Krian, Malaysia, Ophiocephalus-striatus, Paddy, Thiodan, Trichogaster-pectoralis.

In Northern Krian, Perak, Malaysia, the 4 main species of fish found in the paddy fields are Trichogaster pectoralis, Clarias macrocephalus, Ophiocephalus striatus and Anabas testudineus. The 'telaga' of sump-pond constructed adjacent to paddy fields yields a crop worth approximately 1/4 of the annual income from paddy cultivation. This

good fisheries potential needs encouragement. The size of the fish catch will be dependent upon the area, the abundance of aquatic plants and the use of insecticides. The use of Thiodan, BHC and Endrin caused destruction of the fish population.--Copyright 1974, Biological Abstracts, Inc.
W74-13039

THE EFFECT OF SUPPLEMENTARY ALGAL FEEDING OF A HATCHERY BREEDING STOCK OF OSTREA EDULIS L. ON LARVAL VIGOUR.
Ministry of Agriculture, Fisheries and Food, Conway (Wales). Fisheries Experiment Station.
M. M. Helm, D. L. Holland, and R. R. Stephenson.
J Mar Biol Assoc UK. 53(3): 673-684, Illus, 1973. (In Engl. with Engl. summ.).

Descriptors: Fish management, *Fish hatcheries, Algae, *Oysters, Commercial shellfish, Shellfish, Breeding.
Identifiers: Algal, Breeding, Condition, Decline, Dry, Factor, Feeding, Growth, Hatchery, Larval, Meat, Ostrea-edulis, Phyto, Plankton, Rate, Stock, Tetraselmis-suecica, Viability, Vigor, Weight.

Adult European flat oysters, Ostrea edulis, receiving a food supplement of the unicellular alga Tetraselmis suecica during laboratory conditioning for spawning produced more broods of larvae than oysters receiving only the natural phytoplankton in the seawater supply. Many of the broods from adults receiving this extra food were liberated sooner and these larvae grew at an enchanced rate and provided greater spat yields than the broods from the control stock. The viability of larvae, which significantly correlated with their lipid (in particular neutral lipid) proportion at the time of liberation, declined as the length of the stock-conditioning period prior to female spawnings increased. This may be related to the decline in the dry meat weight and the condition factor of the adult oysters during the experiments irrespective of the feeding regime. The extra algal ration provided a check to the decline in dry meat weight of the food-supplemented adults.--Copyright 1974, Biological Abstracts, Inc.
W74-13042

STUDIES ON BIOLOGY OF MASTACEMBELUS PANCALUS (SPINY EEL, HAMILTON) IN ARTIFICIAL PONDS: I. NATURAL HABITAT, DISTRIBUTION, FOOD AND FEEDING HABITS, AND ECONOMIC IMPORTANCE,
Bangladesh Agricultural Univ., Mymensingh. Dept. of Agricultural Management.
For primary bibliographic entry see Field 2H.
W74-13387

NEW CASES OF MASSIVE DEVELOPMENT OF PRYMNESIUM PARVUM CART, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kherson (USSR).
For primary bibliographic entry see Field 5C.
W74-13391

RATE OF SULFATE REDUCTION IN MUD DEPOSITS OF PONDS OF THE 'KARAMETNIYAZ' FISH FARM, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W74-13392

POPULATION DYNAMICS OF HATCHERY-REARED LANDLOCKED SALMON, SALMO SALAR, AT SCHOODIC LAKE, MAINE,
Maine Dept. of Inland Fisheries and Game, Augusta.
For primary bibliographic entry see Field 2H.
W74-13488

9. MANPOWER, GRANTS AND FACILITIES

9C. Research Facilities

SOUTH CAROLINA'S NEW MARINE RESOURCES CENTER,
South Carolina Wildlife Resources Dept., Charleston. Marine Research Lab.
For primary bibliographic entry see Field 2L.
W74-12775

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

WASTEWATER TREATMENT: PHYSICAL AND CHEMICAL METHODS,
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12934

WASTEWATER TREATMENT: ACTIVATED SLUDGE,
McKee (Arthur G.) and Co., San Mateo, Calif.
For primary bibliographic entry see Field 5D.
W74-12935

WASTEWATER TREATMENT: LAGOONS AND OXIDATION PONDS,
Kansas Univ., Lawrence.
For primary bibliographic entry see Field 5D.
W74-12936

WASTEWATER TREATMENT: ANAEROBIC PROCESSES,
Institute of Gas Technology, Chicago, Ill.
For primary bibliographic entry see Field 5D.
W74-12937

WASTEWATER TREATMENT: SLUDGE TREATMENT, UTILIZATION, AND DISPOSAL,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12938

WASTEWATER TREATMENT: WATER RECLAMATION AND REUSE,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W74-12939

WASTEWATER TREATMENT: LAND DISPOSAL OF WASTEWATER,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 5D.
W74-12940

INDUSTRIAL WASTES: PAPER AND APPLIED PRODUCTS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 5D.
W74-12941

A SELECTED, ANNOTATED BIBLIOGRAPHY OF THE CIVIL, INDUSTRIAL, AND SCIENTIFIC USES FOR NUCLEAR EXPLOSIONS.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 5C.
W74-13133

JOJOBA: A WAX-PRODUCING SHRUB OF THE SONORAN DESERT, LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY,
Arizona Univ., Tucson. Office of Arid Lands Studies.
For primary bibliographic entry see Field 2I.
W74-13141

10C. Secondary Publication And Distribution

A SELECTED ANNOTATED BIBLIOGRAPHY ON LAND RESOURCE INVENTORY AND ANALYSIS FOR PLANNING,
Pennsylvania Univ., Philadelphia. Center for Ecological Research in Planning and Design.
For primary bibliographic entry see Field 6A.
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10D. Specialized Information Center Services

TOXIC MATERIALS INFORMATION CENTER ENVIRONMENTAL INFORMATION SYSTEMS OFFICE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-12920

10F. Preparation Of Reviews

WASTEWATER TREATMENT: PHYSICAL AND CHEMICAL METHODS,
Massachusetts Univ., Amherst. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-12934

WASTEWATER TREATMENT: ACTIVATED SLUDGE,
McKee (Arthur G.) and Co., San Mateo, Calif.
For primary bibliographic entry see Field 5D.
W74-12935

WASTEWATER TREATMENT: LAGOONS AND OXIDATION PONDS,
Kansas Univ., Lawrence.
For primary bibliographic entry see Field 05D.
W74-12936

WASTEWATER TREATMENT: ANAEROBIC PROCESSES,
Institute of Gas Technology, Chicago, Ill.
For primary bibliographic entry see Field 05D.
W74-12937

WASTEWATER TREATMENT: SLUDGE TREATMENT, UTILIZATION, AND DISPOSAL,
Delaware Univ., Newark. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-12938

WASTEWATER TREATMENT: WATER RECLAMATION AND REUSE,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 05D.
W74-12939

WASTEWATER TREATMENT: LAND DISPOSAL OF WASTEWATER,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 05D.
W74-12940

INDUSTRIAL WASTES: PAPER AND APPLIED PRODUCTS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
For primary bibliographic entry see Field 05D.
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PROBLEMS WITH DUMPING OF RED MUD IN SHALLOW WATERS. A CRITICAL REVIEW OF SELECTED LITERATURE,
Bundesforschung sanstalt fuer Fischerei, Hamburg (West Germany). Institut fuer Kuesten- und Binnenfischerei Isotopenlaboratorium.
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Cornell University, Policy Models for Water Resources Systems	W74-13017 -- 13021 13023 -- 13026 13028 -- 13030	12
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

- NATURE OF WATER
- WATER CYCLE
- WATER SUPPLY AUGMENTATION AND CONSERVATION
- WATER QUANTITY MANAGEMENT AND CONTROL
- WATER QUALITY MANAGEMENT AND PROTECTION
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